BAY AREA AIR QUALITY MANAGEMENT DISTRICT

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v. 1

July 3, 1991

Dear Interested Party:

Enclosed for your review is the Draft Environmental Impact Report (EIR) for the 1991 Bay Area Clean Air Plan (CAP). The Draft EIR has been prepared by the Bay Area Air Quality Management District (BAAQMD), Lead Agency for the CAP under the California Environmental Quality Act (CEQA). The Draft EIR identifies environmental impacts that could result from implementation of the CAP. The CAP will benefit public health by improving air quality; however, some of the control measures proposed in the CAP could lead to localized adverse impacts.

Although it is not required under CEQA, the BAAQMD is also preparing a Socioeconomic Report which analyzes potential socioeconomic impacts of the CAP. The Socioeconomic Report is nearing completion and soon will be available for public review and comment. A copy of the Socioeconomic Report will be sent to all organizations and individuals receiving this Draft EIR.

Enclosed please also find an Errata sheet for the Draft EIR. Table 6-3 in the Draft EIR is in error and should be replaced with the enclosed table.

The CAP outlines a regional strategy for attaining and maintaining compliance with State ambient air quality standards for ozone and carbon monoxide. The CAP includes many proposed control measures designed to reduce air pollutant emissions from motor vehicles and from industrial and commercial processes.

The public is encouraged to review and comment on the Draft EIR. The comment period for the Draft EIR ends August 19, 1991. Due to legislative deadlines for adoption of the CAP, late comments on the Draft EIR will not be accepted. Commentors are strongly encouraged to submit written comments to the BAAQMD as early in the comment period as possible. Comments should be addressed to:

Henry Hilken, Planner
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

The BAAQMD Board of Directors will conduct a public hearing on the Draft CAP and EIR on Wednesday, July 24, 1991, at 7:00 p.m. The hearing will be held at the Cathedral Hill Hotel, Van Ness at Geary, in San Francisco.

If you have any questions about the Draft EIR, please call Henry Hilken, Planner, at (415) 771-6000.

Sincerely,

Milton Feldstein
Air Pollution Control Officer

939 ELLIS STREET • SAN FRANCISCO, CALIFORNIA 94109 • (415) 771-6000 • FAX (415) 928-8560

RECYCLED PAPER

ERRATA

FOR THE

DRAFT ENVIRONMENTAL IMPACT REPORT

BAY AREA 1991 CLEAN AIR PLAN

JULY 1991

Bay Area Air Quality Management District

939 Ellis Street

San Francisco, California 94109

TABLE 6-3
COMPARISON OF TRANSPORTATION CONTROL MEASURES IN CLEAN AIR PLAN ALTERNATIVES
(Phase Shown in Parenthesis)

1. PROPOSED PROJECT 1991 Clean Air Plan	2. No Project Alternative	3. Acceler-ated Market-Based TCM	4. ROG First Alternative
1. Employer Assistance Program			
a. RIDES' outreach program (1).	Yes	Yes	Yes
b. Telecommuting guidebook (1).	No	Yes	Yes
c. Employee survey (1).	No	Yes	Yes
d. Training materials (1).	No	Yes	Yes
2. Employer Trip Reduction Rule			
a. Trip Reduction Ordinance (1).	Yes	Yes	Yes
b. Promote adoption of TRO (1).	Yes	Yes	Yes
c. Adopt trip reduction rule (1).	No	Yes	Yes
3. Areawide Transit Improvements			
a. BART post-earthquake service (1).	Yes	Yes	Yes
b. Expand Caltrain service (1).	No	Yes	Yes
c. Comprehensive transit planning (1).	No	Yes	Yes
d. Bus service expansion (1).	No	Yes	Yes
e. Rail service expansion (2).	No	Yes	Yes
f. Bus service expansion (2).	No	Yes	Yes
g. Rail service expansion (3).	No	Yes	Yes
h. Bus service expansion (3).	No	Yes	Yes
4. Regional Rail Agreement Expansion			
a. BART to Colma (1).	No	Yes	Yes
b. Other Planned Rail Extensions (2).	No	Yes	Yes
c. New Rail Extensions (3).	No	Yes	Yes
5. Rail Access Improvements			
a. Develop access plans (1).	No	Yes	Yes
b. Implement access plans (1).	No	Yes	Yes
c. Implement Access Plans (2).	No	Yes	Yes
d. Employment Center Coordination (2).	No	Yes	Yes
e. Implement Access Plans (3).	No	Yes	Yes
6. Intercity Rail Service Improvements			
a. Bay Area-Sacramento Service (1).	No	Yes	Yes
b. Expanded Bay Area Sacramento Service (2).	No	Yes	Yes

Table 6-3 (Continued)

		2. No Project Alternative	3. Accelerated Market-Based TCM	4. ROG First Alternative
7.	Ferry Service Improvements			
a.	Post earthquake ferry service (1).	Yes	Yes	Yes
b.	Develop ferry service plan (1).	No	Yes	Yes
c.	Implement Plan (2).	No	Yes	Yes
8.	HOV Lanes on Freeways			
a.	Implement HOV lanes (1).	No	Yes	Yes
b.	Refine MTC HOV Plan (1).	No	Yes	Yes
c.	Expand HOV System (2).	No	Yes	Yes
9.	Bicycle Access Improvements			
a.	Bicycle advisory committees (1).	No	Yes	Yes
b.	Regional Bicycle Route Plan (1).	No	Yes	Yes
c.	Bikes on transit (1).	No	Yes	Yes
d.	Implement Bike Plan (1).	No	Yes	Yes
e.	Implement Bike Plan (2).	No	Yes	Yes
10.	Youth Transportation			
a.	Youth transportation study (1).	No	Yes	Yes
b.	Discount Transit Tickets (2).	No	Yes	Yes
c.	Expand School Bus Service (2).	No	Yes	Yes
d.	Student Ridesharing Service (2).	No	Yes	Yes
e.	Youth Transport Program (3).	No	Yes	Yes
11.	Freeway Traffic Operations System			
a.	Bay Bridge approaches (1).	Yes	Yes	Yes
b.	Refine TOS Plan (1).	No	Yes	Yes
c.	Develop AVI Plan (1).	No	Yes	Yes
d.	Highway Technology Plan (1).	No	Yes	Yes
e.	Expand TOS (2).	No	Yes	Yes
f.	Traffic Advisories (2).	No	Yes	Yes
g.	Ramp metering (2).	No	Yes	Yes
h.	Test of AVI toll collection (2).	No	Yes	Yes
i.	Implement Highway Technology (3).	No	Yes	Yes
12.	Arterial Traffic Management			
a.	Maintain Signal Timing (1).	Yes	Yes	Yes
b.	Develop Arterial Plan (1).	No	Yes	Yes
c.	Expand Signal Timing (2).	No	Yes	Yes
d.	Transit signal preempt (2).	No	Yes	Yes
e.	SMART streets (2).	No	Yes	Yes

Table 6-3 (Continued)

		2. No Project Alternative	3. Acceler-ated Market-Based TCM	4. ROG First Alternative
13.	Reduced Transit Fares			
a.	Inter-service discounts (1).	Yes	Yes	Yes
b.	Promote transit pass subsidies (1).	Yes	Yes	Yes
c.	More transit pass subsidies (1).	No	Yes	Yes
d.	Study fare elasticities (1).	No	Yes	Yes
e.	Bus-rail transfer subsidies (2).	No	Yes	Yes
f.	Target group subsidies (2).	No	Yes	Yes
g.	Transit stores (2).	No	Yes	Yes
14.	Vanpool Liability Insurance			
a.	Study vanpool insurance (1).	No	Yes	Yes
b.	Regionwide Vanpool Insurance Program (2).	No	Yes	Yes
15.	Rideshare Incentives			
a.	Encourage Rideshare Subsidies (1).	No	Yes	Yes
b.	Free tolls for HOV's (2).	No	Yes	Yes
16.	Indirect Source Control Program			
a.	Adopt program (1).	No	Yes	Yes
17.	Public Education			
a.	Education program (1).	No	Yes	Yes
b.	Education program (2).	No	Yes	Yes
c.	Eduction program (3).	No	Yes	Yes
18.	Higher Density Zoning Near Transit			
a.	Study zoning at transit stations (1).	No	Yes	Yes
b.	Encourage Higher Densities (2).	No	Yes	Yes
19.	General Plan Air Quality Elements			
a.	Local agencies adopt elements (1).	No	Yes	Yes
20.	Demonstration Projects			
a.	Telecommuting project (1).	No	Yes	Yes
b.	Alternative fuels project (1).	No	Yes	Yes
c.	Fee collection project (2).	No	Yes	Yes
21.	Revenue Measures			
a.	$1.00 bridge tolls (1).	Yes	Yes	Yes
b.	9 cents per gallon tax (1).	Yes	Yes	Yes
c.	Bridge Toll to $2.00 (2). Vehicle Registration Increased by $4.00 (2). Gas Tax Increase of $.14 /gallon (2).	No	Yes	Yes

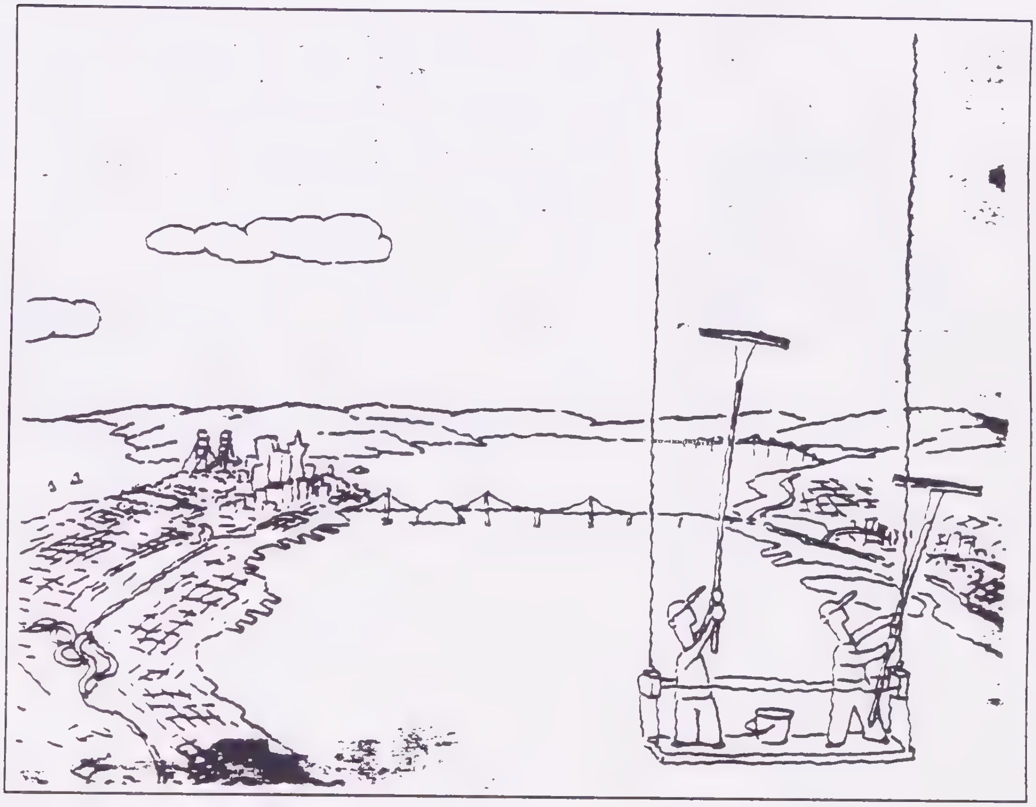
Table 6-3 (Continued)

Market Based Measures	2. No Project Alternative	3. Accelerated Market-Based TCM	4. ROG First Alternative
a. Smog fee (3).	No	Yes	Yes
b. Congestion tolls (3).	No	Yes	Yes
c. Regional parking fee (3).	No	Yes	Yes
d. Increase Gas tax to $2.00 (3).	No	Yes	Yes

Draft Environmental Impact Report

for the

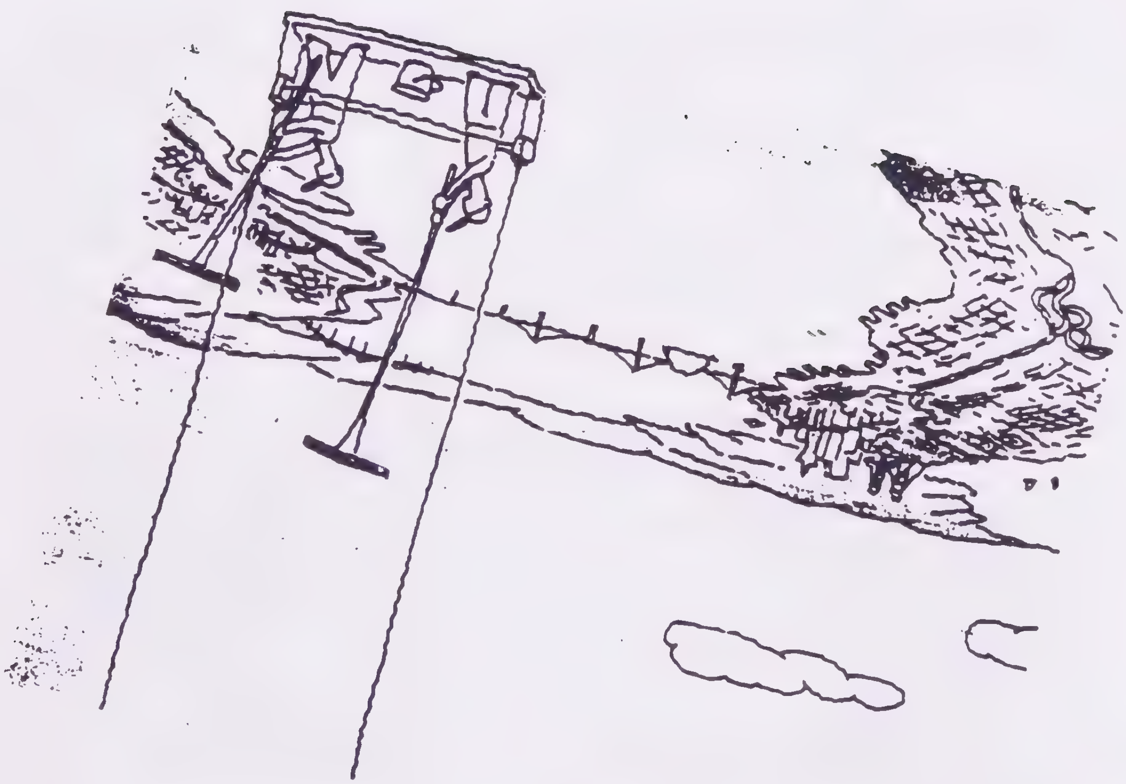
Bay Area 1991 Clean Air Plan



VOLUME 1: Draft EIR

Bay Area Air Quality Management District

July 1991



Cover illustration
by Jack Desrocher

DRAFT ENVIRONMENTAL IMPACT REPORT

for the

BAY AREA 1991 CLEAN AIR PLAN

VOLUME 1: DRAFT EIR

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street
San Francisco, California 94109

July 1991

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1. INTRODUCTION

1. INTRODUCTION

This document is the Draft Environmental Impact Report (EIR) for the 1991 Clean Air Plan for the Bay Area Air Quality Management District (BAAQMD). The EIR is being prepared pursuant to the requirements of the California Environmental Quality Act of 1970 (CEQA), as amended, and in accordance with CEQA Guidelines (1986) published by the State Office of Planning and Research. The BAAQMD is the lead agency for the project evaluated in this Draft EIR.

The EIR is organized and written with the intention of providing a document that is meaningful and useful to decision-makers and the public. To this end, a few notes may be helpful in orienting the reader to the project being evaluated, to the function of this Draft EIR in the environmental review process, and to the content and organization of the document.

1.1 PROJECT UNDER REVIEW

Three public agencies, the Bay Area Air Quality Management District, the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), have cooperated to prepare the 1991 Bay Area Clean Air Plan (CAP, or "the project"). The CAP includes two documents: the <u>Bay Area '91 Clean Air Plan (CAP): Implementing All "Feasible" Controls</u> (April 1991) and the <u>Addendum to Draft Bay Area '91 Clean Air Plan (CAP)</u> (June 18, 1991). The CAP applies to the BAAQMD's jurisdiction to satisfy the requirements of the California Clean Air Act (CCAA). It includes a variety of emissions control strategies designed to achieve emissions reductions for certain air pollutants. Control measures in the CAP affect both stationary and mobile sources of air pollutants. This Draft EIR examines the likely effects that these control measures would have on the environment.

1.2 PURPOSE AND INTENDED USE OF THE DRAFT EIR

The Draft EIR identifies the significant effects that the CAP may have on the environment, examines alternatives to the project, and indicates the manner in which significant effects can be mitigated or avoided. The Final EIR for the project, consisting of this Draft EIR, public comments received on the Draft EIR, and responses to those comments, will accompany the CAP when the BAAQMD considers certifying the Final EIR and adopting the CAP. (The Final EIR will also be used by the BAAQMD when considering future projects contemplated in the CAP.) While the

information in the EIR does not control the BAAQMD's ultimate discretion on the CAP, the agency must respond to each significant impact identified in the EIR by making findings and, if necessary, by making a statement of overriding consideration.

This type of document is called a program EIR in that it is an EIR prepared on a series of actions that can be characterized as one large project. In the case of the CAP, the actions can be characterized as one large project because they are related: a) geographically, b) as logical parts in a chain of contemplated actions, c) as rules, regulations, plans and other general criteria issued to govern the conduct of a continuing program, and d) as individual activities carried out under the same statutory or regulatory authority and having generally similar environmental effects that can be mitigated in similar ways.[1]

As a program EIR, one of the purposes of this document will be to determine whether additional environmental documents need to be prepared for subsequent activities in the program. Also, future narrower environmental impact reports for related projects may incorporate by reference relevant information contained in this EIR. This process is called "tiering." Detailed analysis of specific future actions related to the CAP is constrained by the amount of information that is currently available, which in many cases is limited and conceptual in nature. As a result, approval of the CAP would not eliminate the need to conduct appropriate tiered environmental analyses for future related projects.

1.3 EIR PROCESS

This Draft EIR will be published and circulated for review and comment by the public and other interested parties, agencies and organizations for a minimum 45-day period, during which time public hearings on the Draft EIR will be held. The public will be invited to attend the hearings and to offer comments on the Draft EIR. All written comments or questions about the Draft EIR should be addressed to:

Mr. Henry Hilken, Planner
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Following public review, the Final EIR will be prepared including responses to verbal comments received at the public hearing and to written comments received by the BAAQMD during the public review period. The Final EIR will also be available for public review. The Board of Directors of the BAAQMD will review and consider the Final EIR prior to deciding whether to adopt the proposed CAP. Upon approval of the CAP, the BAAQMD must adopt a mitigation monitoring program for mitigation measures incorporated into the approved project that reduce or avoid significant effects on the environment.

1.4 CONTENT AND ORGANIZATION OF THE DRAFT EIR

This Draft EIR consists of two volumes. The first volume contains the Draft EIR and the second contains technical appendices to the Draft EIR. A separate document contains an analysis of potential socioeconomic effects of the CAP.

The Draft EIR is organized using the following chapters:

1. Introduction: Provides discussion to orient the reader to the project, to the function of the Draft EIR in the environmental review process, and to the content and organization of the document.

2. Executive Summary: Summarizes the CAP, and its potential environmental impacts and alternatives. Mitigation measures suggested for the project to reduce or avoid impacts are also included in this chapter.

3. Project Description: Contains a detailed description of the CAP, including the project location, background, purpose and objectives, and proposed control measures.

4. Environmental Setting, Impacts and Mitigation Measures: Describes the methodology and format used to evaluate environmental impacts; describes existing conditions and background for individual impact categories (setting); and identifies potential project impacts and corresponding mitigation measures for each impact category. Cumulative impacts related to the proposed project are also described in this chapter within each of the impact categories (sections).

5. CEQA Considerations: Provides discussions regarding the project called for in CEQA including: a) the growth-inducing impact of the project; b) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and c) significant irreversible environmental changes of project implementation.

6. Alternatives: Lists a range of reasonable alternatives to the project which could attain the basic objectives of the project; discusses their feasibility; and provides evaluation of the comparative merits of alternatives in terms of their potential environmental effects.

7. Authors and Persons Consulted: Lists the authors and persons, agencies, and organizations contacted during the preparation of the Draft EIR.

8. Bibliography: Cites the documents and references used to prepare the Draft EIR.

9. Glossary and Abbreviations: Lists terms and abbreviations used in the Draft EIR which may be unfamiliar to some readers.

Technical Appendices:
Appendix A: The Notice of Preparation (NOP) and Responses to the NOP
Appendix B: California Clean Air Act (AB 2595)
Appendix C: Toxic Air Contaminant Identification List
Appendix D: Stationary Source Emission Reductions
Appendix E: Fundamental Concepts of Environmental Noise

It is the intention of the Draft EIR preparers that this document present relevant information in a clear, concise manner accessible to the report's readers. The Draft EIR provides a sufficient level of detail to permit full assessment of significant environmental impacts by reviewing agencies and members of the public.

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1. State of California Office of Planning and Research, CEQA Guidelines, Section 15168.

2. EXECUTIVE SUMMARY

2. SUMMARY

2.1 INTRODUCTION

This chapter of the Clean Air Plan Environmental Impact Report summarizes the proposed project and the project environmental analysis including the environmental setting, impacts and mitigation measures, CEQA-required considerations, and alternatives. An overview of the project's potential impacts, their level of significance, mitigation measures designed to reduce or avoid the identified impacts, and the level of significance after mitigation are provided in a summary table in Section 2.4, "Potential Impacts and Mitigation Measures," of this chapter. More detailed impacts and mitigation measures are contained in Chapter 4, by environmental issue area. This summary chapter contains an overview of the remainder of the document. A comprehensive project description is provided in Chapter 3 of this EIR; more detailed descriptions of each of the impacts are in Chapter 4; further discussion of CEQA Considerations are in Chapter 5; and an analysis of alternatives is in Chapter 6.

2.2 PROJECT DESCRIPTION

The CAP is the most recent and broadest regional plan addressing air quality concerns in the Bay Area. It includes a variety of emissions control strategies designed to achieve emissions reductions for certain air pollutants. Prior to the CAP, preparation of air quality attainment plans was only required under the federal Clean Air Act. The CAP is the first air quality attainment plan for the Bay Area in response to a state Clean Air Act. The CAP consists of two documents, the April 1991 CAP and a June 1991 Addendum.

Planning for the attainment and maintenance of federal and State air quality standards in the Bay Area is the joint responsibility of the BAAQMD, ABAG, and the MTC. These agencies have prepared the CAP to set forth a comprehensive program that will continue the Bay Area's progress toward compliance with federal and State air quality standards. The BAAQMD is responsible for all plan elements and control measures dealing with non-vehicular sources of air pollution. ABAG prepared the population and employment projections used as a basis for the CAP. As required

by AB 3971 (Cortese, 1988), MTC and the BAAQMD are jointly responsible for developing transportation control measures for the CAP.

Control measures in the CAP affect both stationary and mobile air emissions sources. Mobile sources include automobiles, trucks and buses. Stationary sources are all other industrial, commercial and residential sources of air pollution. The CAP strengthens many of the control measures previously established in the 1979 and 1982 Air Quality Plans, removing exemptions contained in some measures, improving some measures and adding new control measures. The CAP lists proposed adoption intervals for stationary source measures and divides transportation control measures into three phases for staged adoption.

The CAP uses mobile source control measures to reduce emissions from mobile sources by reducing the use of vehicles and by making the vehicles emit less pollutants per mile. The first method involves reducing the number of vehicle trips or the length of trips, while the latter method reduces emissions through low-emission vehicles and cleaner-burning fuels, improved inspection/maintenance programs, and other measures adopted since 1987. Mobile source control measures consist of:

- employer-based trip reduction measures
- mobility improvements
- traffic operation management control measures
- user incentives
- indirect source review measures
- implementation support measures
- market-based transportation control measures
- ozone excess "no drive days"
- motor vehicle control measures

For detailed descriptions of the control measures, the reader is referred to the discussion in Chapter 3, Project Description, of this EIR.

Stationary source control measures are concerned with point and area sources, excluding biogenic (vegetation) emissions and mobile emissions. Residences, commercial facilities and industrial facilities emit ozone precursors and carbon monoxide in the combustion of fossil fuels primarily for heating, cooling, lighting, operating electrical appliances, and processing materials. Further, fugitive emissions of reactive organic gases, or ozone precursors, result from applying coatings, using solvents, and processing hydrocarbons at refineries and chemical plants.

The stationary source control measures included in the CAP have been divided into seven categories:

- surface coating and solvent use control measures
- fuels/organic liquids storage and distribution control measures
- refinery and chemical processes control measures
- combustion of fuels control measures
- other industrial/commercial processes control measures
- other stationary source control measures
- intermittent control measures

As with mobile source control measures, detailed descriptions of the stationary source control measures are provided in Chapter 3 of this EIR.

2.3 ENVIRONMENTAL SETTING

Physical Setting

The proposed CAP would affect an area roughly contiguous with the boundaries of the San Francisco Bay Area. The Bay Area covers about 5,600 square miles, or 3.6 million acres, with the predominant physiographic feature being the nearly-enclosed basin occupied by the San Francisco Bay. The area includes seven Bay Area counties in their entirety and portions of two others (Solano and Sonoma).

The Bay Area has a number of sheltered inland valleys where conditions of light winds, atmospheric stability, abundant sunshine and high summer and low winter temperatures create a high air

pollution potential. Prominent valleys in the area include the Petaluma-Santa Rosa, Sonoma, and Napa Valleys north of San Francisco Bay, the Livermore and San Ramon Valleys east of San Francisco Bay, and the Santa Clara Valley south of the Bay. In addition, the easternmost part of the BAAQMD jurisdiction extends into the Central Valley. Coast portions of the Bay Area experience moderating influences such as less atmospheric stability, less sunshine, higher wind speeds and more moderate temperatures, and therefore have a lower pollution potential.

Natural Resources

Like virtually every California community, the Bay Area is dependent on three major types of energy: petroleum fuels, natural gas and electricity. Electricity production is accomplished using other energy resources such as petroleum fuels, natural gas, and nuclear, solar, wind and hydro energy. In general, oil supply is currently provided equally from in-state and Alaskan production. Electricity and natural gas are supplied to the Bay Area by Pacific Gas & Electric Company (PG&E), which employs a variety of the energy sources listed above to meet its energy demands. Water services in the Bay Area are provided by municipalities or special service districts.

The San Francisco Bay Region supports a diversity of native and non-native plant communities. The principal communities include: coastal zone, valley, and forest communities, as well as oak woodlands, brushlands, and urban and agricultural. A high variety of wildlife habitats are also contained in the Bay Region, which differ somewhat from the vegetation communities listed above. Habitat types include: marine, saline emergent wetland and estuarine, coastal scrub, redwood forest, valley foothill riparian, annual grassland, perennial grassland, fresh emergent wetland, closed-cone pine-cypress, Douglas-fir forest, Ponderosa pine forest, montane hardwood-conifer and montane hardwood forests, oak woodlands, mixed and chamise-redshank chaparral, urban and orchard-vineyard and cropland. In addition, there are a number of sensitive plant and animal species known to occur within the project area. These species tend to occur in native habitats, especially those habitats of limited extent and distribution such as vernal pools, coastal salt marshes, freshwater marshes, and perennial grasslands.

Population

Approximately six million people live in the Bay Area, occupying approximately 2.3 million homes. The Bay Area has experienced extremely high housing costs for a number of years, due in part to the lag in housing production in relation to job growth. Between 1980 and 1990, population in

the Bay Area counties grew by more than 16 percent. The most rapid growth occurred in Solano County, with other large-growth counties consisting of Santa Clara, Alameda and Contra Costa. The counties of Napa and Marin grew the least. San Francisco's population declined.

The population of the Bay Area is one of the most ethnically diverse in the world, with ethnic groups from virtually every country represented. Whites comprise about 61 percent of the Bay Area population, Hispanics about 15 percent, Asian and Pacific Islanders approximately 15 percent, Blacks about 9 percent, and other races under 1 percent.

Currently, it is estimated that Bay Area employers provide nearly 3.1 million jobs. The services sector is the largest employer in the Bay Area, accounting for about one quarter of the jobs in the region. Service businesses include personal services, business services and professional services. Manufacturing firms provide about 17 percent of total Bay Area jobs, while retail businesses employ nearly 16 percent of all workers. Government is the fourth largest major sector in the region with about 15 percent of all non-agricultural employment.

<u>Land Use</u>

Of the total land area in the Bay Area region, approximately 14 percent or more has been developed. San Francisco is the most urbanized county with nearly 79 percent of land developed, whereas the most rural is Napa with just over 3 percent of the land area developed. Alameda, Contra Costa and San Mateo Counties have slightly less than a quarter of their land areas developed with urban uses.

Land development in the region is affected by myriad policies and programs, including local general and specific plans, local zoning regulations, sewer hookup moratoria, building permit allocation measures and growth initiatives. Regionwide planning for the Bay Area is influenced by several agencies, including the BAAQMD, ABAG and the MTC. Policies and programs of the Bay Conservation and Development Commission and The California Coastal Commission also influence development in the region.

<u>Transportation</u>

Bay Area counties, incorporated cities within these counties, and the California Department of Transportation (Caltrans) are the primary agencies responsible for planning, funding, designing,

constructing, operating and maintaining new and existing streets and highways in the region. Inter-county bus and ferry public transit services are operated between Sonoma, Marin and San Francisco counties by the Golden Gate Bridge, Highway & Transportation District, and a few cities and counties also fund and operate public transit services. These include the cities of San Francisco, Fairfield, Napa, Vallejo and Santa Rosa, and the counties of Sonoma and Marin. In addition, various special service districts have been established to plan, fund, design, construct, and operate public transit services in the Bay Area. These districts (listed here using their abbreviated names) include AC Transit, BART, the CCCTA, LAVTA, SamTrans, the SCCTD, WestCat, and Tri-Delta. Finally, Caltrans is currently responsible for operating the Caltrain service between San Jose and San Francisco in cooperation with the transit districts of San Mateo and Santa Clara County.

Air Quality

Present air quality problems in the Bay Area result from extensive industrial and urban development, especially the widespread and intensive use of motor vehicles by Bay Area residents. (As an example of the impact of vehicle emissions on air quality, emissions inventories prepared by the BAAQMD indicate that 50 percent of the ozone precursors are generated by automobiles.) Further, topographic and meteorological conditions often reduce the ability of the atmosphere to disperse air pollutants, thereby causing such pollutants to reach relatively high ambient concentrations.

Regionally, the most severe and complex air quality problem is the relatively high level of ambient ozone experienced during warm, meteorologically stable periods, in the summer and fall. Although the Bay Area's highest ozone levels can fluctuate from year to year, standards are most often exceeded in the Santa Clara, Livermore, and Diablo Valleys.

In contrast to ozone, carbon monoxide (CO) is a sub-regional problem in the Bay Area. It is estimated that 85 percent of CO in the Bay Area is generated by automobiles. CO standards are occasionally exceeded in those parts of the Bay Area subject to a combination of high traffic density and susceptibility to the occurrence of surface-based radiation inversions during the winter months. From 1987 to 1989, three sub-areas of the Bay Area exceeded CO standards.

2.4 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Table 2-1, which begins on the following page of this document, presents the potential environmental impacts of the proposed project, along with the mitigation measures that have been identified to avoid the impacts or, where possible, to reduce their level of significance. The potential level of significance of each impact is listed both before and after mitigation. Potential project impacts may be significant, less-than-significant, beneficial or significant and unavoidable. This table is a condensed version of the numerous detailed impacts and mitigation measures presented in Chapter 4. The purpose of the condensed table is to provide a more readable presentation. A forthcoming mitigation monitoring program for the CAP EIR will list all impacts and mitigation measures in Chapter 4 in tabular form. Significant and unavoidable impacts are noted in Chapter 5, "CEQA Considerations", of this EIR, and are summarized in Section 2.5 below.

2.5 CEQA-REQUIRED CONSIDERATIONS

Growth Inducement

The CAP would induce substantial growth around transit centers and corridors to include employment centers and residential centers. It is not anticipated that the CAP would induce growth in the region, and that it would tend to focus growth and development along transit corridors. The CAP would also result in the construction of new transportation facilities such as HOV lanes, expansion of rail lines and transit corridors. This would lead to new growth occurring along these expanded transit corridors as mixed use development clusters are formed along these corridors. The CAP could cause growth inducement in areas which are currently suburban in character or underdeveloped as growth is channeled into transit corridors.

The CAP would direct and focus growth rather than allow growth to occur randomly in areas which are not served by efficient transit modes. In addition to growth induced in the Bay Area, the CAP may indirectly induce growth in adjacent communities outside the region, as other counties absorb overflow growth which cannot be accommodated in the region.

Relationship Between Short-Term Uses of the Environment and the Maintenance of Long-Term Productivity

The CAP is not expected to increase local short-term uses that would affect long term productivity. By complying with state and federal air quality standards, the CAP would enhance long-term productivity in the Bay Area. The long-term effect of the Clean Air Plan would be improved air quality. Improved air quality would be a beneficial effect to society, resulting in improved public health and welfare and improved productivity for the Bay Area. To achieve this effect, there would be some short-term adverse impacts from implementation of the CAP. These short-term impacts include the commitment of financial, material, and human resources, in addition to environmental resources. Implementation of the Clean Air Plan would maintain and even increase long-term productivity of the environmental resources, in addition to air quality and public health. Implementation of the CAP mobile source control measures would substantially reduce the consumption of natural resources, especially nonrenewable fossil fuels, for transportation in the Bay Area.

Significant Irreversible Effects

CAP control measures may involve short-term increased energy use associated with construction projects such as rail extensions or development along transit corridors, as well as some long-term increased energy use from possible emissions abatement devices or additional transit facilities and services. However, the net effect of the project would be to decrease consumption of non-renewable resources by reducing fuel consumption and improving air quality. Commitments of non-renewable resources are expected to occur in areas of existing development as opposed to areas which were previously undeveloped or inaccessible. Non-fuel non-renewable resources would not be directly affected by the proposed project. The project may cause an increased likelihood of environmental accident involving alternative fuels or hazardous materials (e.g., ammonia) or wastes (e.g., contaminated carbon from filters) which could damage environmental resources. However, there would be a degree of reduced environmental risk achieved due to a reduction in the transportation, use and disposal of hazardous materials (such as fuels, benzene and solvents) in the region.

2.6 ALTERNATIVES

The three alternatives to the proposed project which are analyzed in this DEIR include:

- Alternative 1 - "No Project"

- <u>Alternative 2 - "Accelerated Market-Based TCM"</u>
- <u>Alternative 3 - "ROG-First Control Strategy"</u>

Each of these alternatives is discussed in detail in Chapter 6, Project Alternatives.

Based on the analysis, the environmentally superior alternative is the "Accelerated Market-Based TCM." In the proposed project, market-based TCMs would be implemented in Phase 3, after 1997; whereas, in the "Accelerated Market-Based TCMs" Alternative, market-based TCMs would be implemented in Phase 1, before 1994. However, the BAAQMD estimates that legislative authority to implement the market-based measures cannot be put into place before 1997. The "Accelerated Market-Based TCM" alternative assumes, contrary to the belief of the BAAQMD, that legal authority to implement these measures could be in place before 1994. The "Accelerated Market-Based TCM" Alternative was selected as the environmentally superior alternative because it would achieve larger emission reductions earlier, thereby reducing the exposure of the population to high levels of ozone sooner. However, this alternative is very unlikely to be possible to implement.

The "No Project" alternative is analyzed as a requirement under CEQA. The "No Project" alternative is not a legally-viable alternative with respect to the California Clean Air Act (CCAA). Under this alternative, air quality and transportation benefits would not be as great as those predicted for the proposed project.

The "ROG-First Control Strategy" alternative, consistent with the BAAQMD's historical attainment strategy, would emphasize reactive organic compound reductions prior to NO_x reductions. Air quality modeling has indicated that this strategy would eliminate the "hotspots" of ambient ozone concentrations that occur when reducing ROGs and NO_x simultaneously. This alternative would achieve progress toward attainment of federal and State ozone standards, roughly equivalent to the proposed project, and would reduce the overall population's exposure to ambient ozone, compared to the proposed CAP.

TABLE 2-1

SUMMARY OF ENVIRONMENTAL EFFECTS

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.1 AIR QUALITY			
Implementation of the proposed project would result in a beneficial effect on air quality through a net reduction in emissions of carbon monoxide and ozone precursors.	B	None recommended or required.	B
Despite overall emission reductions, the proposed project could result in localized ozone exceedances which would be considered a significant and adverse air quality impact.	S	Prior to adoption of control measures to reduce NO_x emissions, the BAAQMD would perform air quality modeling to evaluate ozone "hotspots" and to identify potential mitigation measures.	SU
TCMs would result in a beneficial effect on air quality through a net reduction in emissions.	B	None recommended or required.	B
Implementation of TCMs would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust.	S	Methanol-fueled or electric buses would be used where transit districts determined they were feasible. Transit facilities determined by the BAAQMD to pose a significant health hazard would be identified and the responsible agencies encouraged to take actions to reduce this impact.	SU
TCMs could result in an increase in emissions of carbon monoxide at intersections in the vicinity of transit facilities, possibly leading to localized elevated CO concentrations.	S	Project sponsors would conduct traffic/air quality analyses for TCMs that would result in an increase in local traffic in the vicinity of transit facilities and take actions to reduce this impact.	SU
TCMs 3, 4, 5, 7, 8, and 9 would result in construction-related emissions which could cause local exceedances of air quality standards.	S	Emissions would be reduced by minimizing idling time for all heavy equipment and frequent exhaust system inspections and maintenance.	LS

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		The BAAQMD would encourage project sponsors to require contractors to inspect sources of fugitive dust and coordinate control measures.	
TCM 10 and control measure H3 would promote the use of clean fuel vehicles; which would increase emissions of formaldehyde, a suspected carcinogen.	S	Vehicular emissions of formaldehyde would be reduced by a requirement to have tailpipe catalytic controls installed on clean-fuel vehicles burning methanol.	SU
TCM 10 and control measure H3 could increase fugitive emissions of methane, a greenhouse gas.	S	ARB would adopt regulations governing the emissions of methane during the transport and combustion of this fuel. BAAQMD would adopt regulations governing the emissions of methane during the storage and dispensing of this fuel.	LS
TCMs 11 and 12 would result in a small increase in vehicle miles traveled and consequently an increase in emissions of particulate matter (PM_{10}).	LS	None recommended or required	LS
The stationary source control measures would result in a beneficial effect on air quality through a net reduction in emissions of reactive hydrocarbons and oxides of nitrogen.	B	None recommended or required.	B
An increase in stratospheric ozone depleting substances, toxic air contaminants and substances contributing to global warming may occur for stationary source control measures.	S	The BAAQMD would adopt regulations that would restrict the use of chemicals which are ozone depleting, contribute to the greenhouse effect or which would be toxic air contaminants in the reformulation of the coatings.	LS
The increased use of incinerators to achieve regulatory standards for ROG would increase combustion emissions of NO_x and CO.	LS	The BAAQMD permit process would limit the emissions of NO_x and CO from control measures that might utilize incineration for compliance.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Control measures to reduce emissions of NO_x may utilize ammonia, a hazardous material, to reduce emissions of NO_x.	S	The BAAQMD would adopt regulations limiting the emission of ammonia from add-on controls using ammonia to control NO_x emission standards.	LS
4.2 TRANSPORTATION			
The transportation control measures and the mobile source measures (G3, H1, H3 and contingency measures H2, H4 and G4) would reduce trips and vehicle miles traveled by increasing the cost of vehicular traffic, improving transit alternatives and encouraging people to take transit. This would result in an overall benefit to regional traffic in terms of reduced congestion and increased vehicle speeds.	B	None recommended or required.	B
The TCMs would encourage people to use transit or reduce trips rather than drive. This would tend to create parking overflows into neighborhoods surrounding transit stations and major employers (those required to charge parking fees according to the Trip Reduction Rule).	S	Implementation of TCM 5 (preparation and implementation of transit access plans). Preparation and implementation of parking control plans by developers, transit operators, cities, and counties for areas surrounding transit stations. Preparation and implementation of parking overflow control plans by employers required to charge for employee parking.	SU
Increased traffic on local streets and highways serving transit (bus, rail, ferry) stations and park and ride lots. This increase would be due to transit improvements plus land use policies to increase development intensities in the vicinity of transit stations.	S	TCM 5 (preparation and implementation of transit access plans) Preparation and implementation of traffic control plans by developers, transit operators, cities, and counties for areas surrounding transit stations.	SU

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TABLE . (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Traffic access and control plans would include measures such as installation of additional traffic control devices (stop signs and traffic signals), installation of traffic diverters, improved guide signing, improved parking lot driveway design, improved pick-up/drop-off area design, street widenings, and the construction of new streets in the vicinity of transit stations, plus the transit access improvement measures contained in TCM 5.	
TCM 7 would result in potentially significant increases in traffic on local streets and highways serving ferry terminals.	S	Ferry operators and MTC would develop and implement traffic access and control plans for each ferry terminal. These plans would include measures specified above.	SU
TCM 8 would result in potentially significant increases in parking overflows onto local streets in the vicinity of park-and-ride lots supporting the high occupancy vehicle (HOV) lanes.	S	Caltrans and responsible cities and counties would prepare parking impact studies and mitigation programs for each proposed park-and-ride lot. The mitigation programs would include actions such as setting up residential parking permit programs, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations, etc.	SU
TCM 8 would potentially result in an increase in traffic accidents where vehicles would enter and leave the HOV lanes.	S	Caltrans would develop and incorporate into updated regional HOV system plan recommendations for improved designs for HOV lanes that provide safer entry and exit locations for HOVs.	LS
TCM 11 would result in significant increases in traffic congestion and delay on local streets due to freeway ramp metering.	S	Caltrans would develop and implement a traffic control plan for each facility to be metered. Traffic control plans would include measures specified in TCM 12, such as optimization of current signal coordination on affected local streets, installation of improved traffic control and coordination devices (new controllers, interconnect conduit, master	SU

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		controllers, and new traffic signals), installation of traffic diverters to prevent diversion to side streets, improved guide signing, peak period parking prohibitions, and local street widenings.	
TCM 13 could result in significant increases in transit ridership that might cause significant overloading of transit vehicles.	S	Implementation of TCMs 3 and 4, transit and rail service expansions, would mitigate this effect.	LS
TCM 18 would result in potentially significant increases in parking overflows and traffic on local streets and highways serving rail transit stations.	S	Cities and counties would require developers to prepare and implement parking control plans to detect and correct overflow parking problems. The mitigation program would include actions such as setting up residential parking permit programs, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations.	SU
		Cities and counties would prepare and implement traffic access and control plans for each transit station.	
4.3 LAND USE AND PLANNING			
The TCMs could disrupt the physical arrangement of established communities indirectly by changing the jobs/housing balance.	S	The BAAQMD would encourage city and county governments to amend General Plans and Zoning Codes to allow for mixed use developments.	LS
The TCMs would reduce parking needs of employment and commercial centers, thereby making land available for other uses.	B	None recommended or required.	B
TCMs would reduce nuisance impacts from traffic noise to surrounding existing land uses.	B	None recommended or required.	B

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T[illegible]E 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
TCMs would alter the existing land use mixes causing a conflict with existing general plans and zoning.	S	The BAAQMD would encourage the responsible governmental agencies to amend general plans and CMPs.	LS
TCMs could result in the disruption or division of the physical arrangement of an established community.	S	Transit authorities responsible for rail extensions resulting from implementation of the CAP would be encouraged by the BAAQMD to locate new rail lines and stations underground where they would otherwise conflict with established communities.	SU
TCMs would alter the pattern of land use to encourage development which minimizes auto dependence and concentrates growth near transit stations.	S	The BAAQMD would encourage city and county governments to amend general plans to include air quality elements and allow for high densities around transit stations and mixed-use development.	LS
TCMs could conflict with growth management policies of local jurisdictions by inducing growth near transit stations.	S	The BAAQMD would encourage local jurisdictions to modify growth management policies to allow high density mixed-use development nodes near transit centers.	LS
TCMs would induce substantial growth or concentration of population around transit stations and disrupt the physical arrangement of established communities.	S	The BAAQMD would encourage city and county governments to amend general plans to allow for high density and mixed-use zoning near transit stations.	LS
4.4 POPULATION, EMPLOYMENT AND HOUSING			
TCMs would result in the employment of transit coordinators, by government agencies and private employers.	B	None recommended or required.	B
TCMs 1 and 2 may contribute marginal pressure toward a redistribution of housing value, increasing values in	LS	None recommended or required.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
proximity to transit facilities and reducing values at other housing locations.			
Construction projects to implement mobility improvements would create additional employment in construction industries.	B	None recommended or required.	B
Expanded bus and rail transit operations would provide new jobs for vehicle operators, maintenance workers and administrative personnel.	B	None recommended or required.	B
Mobility measures should have largely positive effects on business by reducing transportation costs attributable to congestion. This may counteract the increased costs and associated employment impacts of other air quality rules.	B	None recommended or required.	B
Increased transit efficiency may contribute marginal pressure toward a redistribution of housing value, increasing values in proximity to transit facilities and reducing values at other housing locations.	LS	None recommended or required.	LS
Indirect Source Review may increase development costs in certain locations and alter the distribution of employment over the long term. It may also affect the availability, affordability and location of housing.	LS	None recommended or required.	LS
TCMs which encourage high-density development and transit-oriented design in proximity to transit stations and facilities increase the stock of affordable housing, and increase the efficiency and reduce the cost of transit for those who live closer to the stations.	B	None recommended or required.	B

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
TCM 18 would increase the population and labor force in the region.	S	None available.	SU
The increased costs of transportation due to the market-based measures would have broad repercussions in the regional economy, possibly resulting in lower employment growth.	S	The District should consider whether certain types of businesses, providing essential transportation services should be exempted from the market-based revenue measures.	SU
Stationary source control measures would increase costs for many industries and business. These costs may result in reduced employment or slower employment growth.	S	None available.	SU
4.5 PUBLIC HEALTH AND SAFETY			
TCMs would reduce the concentrations of ozone, CO, NO_2, and benzene present in the region's air, and would consequently reduce an existing potential public health hazard.	B	None recommended or required.	B
TCMs could involve the use of alternative fuels which may present potential health and safety hazards.	S	Potential health and safety effects from other possible alternative fuels would be considered, and mitigation measures developed, prior to requiring the use of such fuels in vehicle fleets.	LS
Contingency Measure H4, if implemented, would reduce diesel exhaust emissions from urban buses thereby reducing an existing public health hazard.	B	None recommended or required.	B
Implementation of control measure H3 and Contingency Measure H4 would increase electrical usage for vehicles and electricity distribution system development, which would increase human exposure to EMF.	LS	None recommended or required.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Implementation of stationary source control measures A1 through A13, A18, and A19 may reduce hazardous waste generation by reducing or replacing existing solvent uses in manufacturing and clean-up processes.	B	None recommended or required.	B
Implementation of stationary source control measures A1, A2, A3, A5 through A13 and A18 may increase emissions of substances that are toxic as a result of reformulations with non-precursor or "exempt" solvents.	S	The BAAQMD would adopt regulations which would not allow the use of chemicals which are ozone depleting, contribute to the greenhouse effect, or which would be toxic air contaminants, in the reformulation of coatings.	LS
Implementation of stationary source control measures A9, A14, A15, B1, B3, B5, B6, C4, E1, and E4 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon.	S	None recommended or required.	LS
Implementation of control measures A9, A14, A15 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon. This would be a significant impact.	S	Generators of solid and liquid hazardous waste would be obligated to follow federal, State and local laws and regulations for proper storage, handling and disposal of such wastes.	LS
Implementation of stationary source control measures B1 through B6 and C1 through C6, and F4 would act to reduce emissions of benzene and would reduce public health risks associated with such emissions.	B	None recommended or required.	B
Implementation of stationary source control measure B4, C1, C2, and C3 would reduce vapor leaks of flammable materials and reduce the fire hazard associated with such leaks.	B	None recommended or required.	B

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Implementation of stationary source control measures D1 through D4 could involve the use of ammonia and catalyst materials, and could create potential health impacts from increased ammonia production, transport, storage, and use. Spent catalyst materials would also contribute to an increase in hazardous waste for disposal.	S	The BAAQMD would consider alternatives to methods which use ammonia as a reducing agent when promulgating requirements for NO_x emission reduction technologies and would consider the design of ammonia storage and handling equipment during the permit review process for individual facilities.	LS
4.6 PUBLIC SERVICES AND UTILITIES			
Implementation of TCMs would place additional demands on human resources at public agencies. If city, county or regional public agencies were unable to handle the additional demand, this would be a significant public services impact.	S	This impact would be reduced to a less than significant level by hiring more employees as resource needs arise. Funding mechanisms would need to be put in place to cover additional costs incurred for implementation of these measures.	LS
Implementation of TCMs would reduce vehicle trips. This would be a beneficial effect on public services.	B	None recommended or required.	B
Implementation of TCMs would result in construction and/or improvement of transit-related and housing facilities. A significant public services impact would occur if storm sewer capacities were exceeded due to redirected drainage patterns.	S	Construction plans for specific mobility improvements would be reviewed by the permitting agency to minimize drainage system demand and flood hazards. For projects where flood hazards are inevitable, flood control measures and drainage systems would be designed or expanded to accommodate new drainage requirements.	LS
Implementation of TCMs would require coordination between neighboring jurisdictions on signal timing and other strategies. This would be a less than significant impact.	LS	None recommended or required.	LS
Implementation of TCMs would create increased demand on local services and utilities for high-density residential	S	This impact would be reduced to a level of insignificance through local government verification of appropriate utility	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
housing or commercial development. If the infrastructure was not equipped to handle the increased demand, this would be a significant public services and utilities impact.		capacities prior to approval of development and provision of on- and off-site utility system improvements to meet requirements, if necessary. Water and solid waste conservation techniques should be required by local permitting agencies to reduce project service demand.	
Implementation of TCM 18 would lower per capita consumption rates of municipal and domestic water supply due to increased development densities. This would be a beneficial public utilities effect.	B	None recommended or required.	B
Implementation of mobile source control measures would require certain fleet operators to purchase and operate cleaner vehicles. This would be a significant public services and utilities impact.	S	This impact could be reduced by garnering more resources to pay for equipment and personnel.	LS
Implementation of certain stationary source control measures would encourage facilities to use pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous-waste related demands, this would be a significant public services and utilities impact.	S	Control device residues, e.g., spent activated carbon, would be regenerated or recycled, whenever possible, to reduce quantities of hazardous waste generated. Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations. The BAAQMD would encourage local cities and counties to consider additional requirements for emergency response	LS

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		workers and enforcement officers when assessing staffing and equipment requirements.	
Implementation of stationary source control measures would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.	S	None available.	SU
Implementation of certain stationary source control measures may result in a decrease in hazardous waste produced at the respective facilities. This would be a beneficial public services effect.	B	None recommended or required.	B
Implementation of certain stationary source control measures would result in a fire safety advantage. This would be a beneficial public services effect.	B	None recommended or required.	B
Implementation of stationary source control measures would cause many industries to utilize ammonia injection (noncatalytic) and selective catalytic reduction (SCR) control technologies which use and generate hazardous substances. If the local infrastructure was unable to handle the additional hazardous substance-related demands, this would be a significant public services and utilities impact.	S	Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations. The District would encourage local cities and counties to consider additional requirements for emergency response and health department workers when assessing staffing and equipment requirements. Ammonia injection and SCR control device residues would be regenerated or recycled, whenever possible, to reduce quantities of hazardous materials and waste.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Implementation of stationary source control measures may increase methanol-fueling for small turbines, or those not equipped with SCR. This would be significant public services impact.	S	This impact could be reduced to a less than significant level through hiring of additional emergency response personnel and preparation of methanol-specific emergency response plans for facilities known to use methanol fueling techniques. Emergency response plans would be developed to include health and safety requirements for emergency response workers and facility descriptions.	LS
Implementation of stationary source control measures would result in temporary, decreased use of devices that can cause fires, spills, and accidents. This would be a beneficial public services effect.	B	None recommended or required.	B
4.7 ENERGY			
Implementation of the TCMs would reduce VMT and increase commuter use of alternative modes of transit. This would be a beneficial energy effect.	B	None recommended or required.	B
Implementation of the TCMs would reduce VMT and increase vehicle speeds. This is a potentially beneficial energy effect.	B	None recommended or required.	B
Implementation of TCMs would utilize energy for construction. This would be a potentially significant energy impact.	S	During subsequent CEQA review, local government agencies, transit operators, Caltrans, and MTC (where appropriate) would conduct an analysis of construction alternatives for each proposed project that would evaluate the energy demand so that suggestions could be made regarding the least energy intensive methods.	LS
Operation of new alternative transit lines would consume energy.	LS	During CEQA review, project-specific energy analysis would be conducted to evaluate the energy efficiency of the project	LS

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		and determine whether additional conservation mechanisms are available to reduce energy consumption.	
The Indirect Source Review control program would encourage energy-saving developments in the Bay Area.	B	None recommended or required.	B
Implementation of TCM 18 would result in energy demand to provide services to the high-density residential development.	B	None recommended or required.	B
Implementation of Contingency Measure H2, "High Polluting Vehicle Retirement Program," would improve fuel efficiency through replacement of older vehicles.	B	None recommended or required.	B
Implementation of Measure H3 could increase demand among certain fleet operators to purchase and operate clean fuel vehicles. This would be a significant impact.	S	Technologies are being developed that would reduce the energy loss due to combustion inefficiencies. However compared to petroleum, these engines would still be less efficient in the next decade. New methanol resources may need to be developed due to increased demand.	SU
Implementation of certain stationary control measures would result in the use of additional pollution control devices that consume energy.	S	Pollution control devices would be reviewed and approved based on energy efficiency standards developed under F3, "Promotion of Energy Efficiency."	LS
Some facilities may choose electrification as the option for compliance with Measure D1.	S	All operations would be evaluated to maximize energy efficiency.	LS
F3, "Promotion of Energy Efficiency" would establish a goal of increasing energy efficiency within the District by a specified amount.	B	None recommended or required.	B

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Implementation of G1 and G2 would result in temporary, decreased use of devices that consume energy.	B	None recommended or required.	B
4.8 BIOLOGICAL RESOURCES			
The CAP would result in the overall improvement of the air quality in the San Francisco Bay Area, and improved air quality would be beneficial to biotic resources in the region.	B	None recommended or required.	B
Transportation Control Measures 3, 4, 5, 7, 8 and 9 would all involve the construction of structures and/or facilities in support of these measures, such as transit stations, HOV lanes, and bicycle facilities. If these new structures and/or facilities are located in sensitive habitats, they may result in significant impacts to sensitive plant and/or animal species.	S	All jurisdictions with facility siting authority should conserve sensitive environments by preserving these areas whenever possible or compensating for the loss of the resource where feasible and avoidance is not possible. Preservation of those lands should be accomplished through regulatory controls, incentive measures, and direct local jurisdiction expenditures. Local and State jurisdictions with siting review authority are responsible for implementing proper siting controls to ensure the protection of sensitive habitats, and species of plants and wildlife.	LS
Possible changes in land use that may result from indirect source rules and high-density zoning near transit stations could result in significant impacts to sensitive habitats and species.	S	See mitigation measure above concerning preserving sensitive habitats.	LS
Contingency Measure H4, if implemented, could result in the need to increase the production of electrical energy to support the measure. If added electrical energy sources are required, more hydroelectric facilities or other types of electrical generating facilities may need to be developed. If these new structures and/or facilities	S	See mitigation measure above concerning preserving sensitive habitats.	LS

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
are located in sensitive habitats, they may result in significant impacts to sensitive plant and/or animal species.			
4.9 GEOLOGY, SOILS AND SEISMICITY			
Implementation of the following control measures -- TCMs 3, 4, 5, 7, 8, 9, and 18 -- would involve grading, excavation or other earthmoving activities which could cause disruptions, displacements, compaction or overcovering of soils; changes in ground surface relief features; and erosion. If Contingency Measure H4 is implemented, it would also contribute to this impact.	S	Construction projects associated with CAP control measures should both minimize grading and excavation, and balance import and export of earth materials to the extent feasible given project design. Grading and excavation for projects associated with the CAP should be performed so as to cause minimal erosion. Where necessary, projects should include grading and erosion control plans. Techniques to minimize erosion should include, but not be limited to, avoiding winter earth moving activities where feasible, leaving rough graded surfaces to facilitate re-vegetation, using coverings and mulches on disturbed areas, and replanting as soon as possible after construction.	LS
Implementation of TCMs 3, 4, 5, 7, 8, 9, and 18 cited above may cause development in areas of geotechnical hazards such as earthquake faults, subsidence or liquefaction areas, or landslides. Such development could expose people and property to geologic hazards.	S	Where specific development projects associated with CAP control measures are located in areas of potential geologic hazard, project-specific geologic reports should be required to evaluate the hazards and to propose design and/or construction methods to reduce the effects of the geologic condition(s) on the project. Geotechnical reports would be prepared by a geologist registered in the State of California.	LS
4.10 HYDROLOGY AND WATER QUALITY			
Implementation of the TCMs would reduce commuter	B	None recommended or required.	B

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
vehicle trips, thereby reducing automobile-related water pollution.			
Implementation of TCMs 3, 4, 5, 7, 8, 9 and 18 could result in degradation of surface water and groundwater quality through construction-related sediment and chemicals. This would be a potentially significant impact.	S	All construction projects must comply with individual city and county policies for building and grading operations. In addition, local building authorities would be encouraged to require that a spill prevention and control plan be implemented for all construction activities.	LS
Implementation of TCMs 3, 4, 5, 7, 8, and 9 would result in construction and/or improvement of transportation facilities. Flood hazards may be caused by redirected drainage patterns. This would be a significant hydrology impact.		All construction plans associated with transportation facilities would be subject to environmental review and would be reviewed by local jurisdictions to minimize flood hazards and drainage system demand. For projects where flood hazards are inevitable, flood control measures and drainage systems would be designed or expanded (flood-proofed) to accommodate new drainage capacity requirements.	
Implementation of many stationary source control measures may result in pollution control devices that generate hazardous waste. This would be a potentially significant water quality impact.	S	Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations. Compliance with all necessary regulations would reduce this impact to a less than significant level. Where possible, facilities would use recyclable or regenerative control devices to reduce the amount of hazardous waste generated.	LS
Implementation of A4, A5, A6, A13, A17, and A18 would decrease the amount of hazardous wastes generated at regulated facilities.	B	None recommended or required.	B

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Implementation of measures D1 through D5 would cause many facilities to utilize SCR and ammonia injection (noncatalytic) control technologies. These technologies use and generate hazardous substances, and this would be a potentially significant impact on local water resources.	S	Local health departments would be encouraged to require facilities that utilize SCR or ammonia injection (noncatalytic) technologies to implement an inspection and maintenance program to eliminate the plugging and corrosion downstream from the reactor. All facilities that utilize SCR or ammonia injection (noncatalytic) would comply with all NPDES requirement for industrial wastewater and surface water discharges. Deposits would be removed from the pollution control system using water or steam soot blowing techniques. Wash water may need to be treated as hazardous waste prior to discharge.	LS
Implementation of measures D1 through D7 would decrease NO_x emissions and decrease the amount of acid deposition in the Bay Area.	B	None recommended or required.	B
4.11 NOISE			
In general, the TCMs, measure G3 and Contingency Measure G4 would reduce vehicle miles travelled and, therefore, reduce noise. At the same time these measures would increase vehicle speeds and increase noise. If there is a net increase in ambient noise levels, a significant impact would occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.	S	Many mitigation measures for highway noise have been included in the construction of existing highways and adjacent developments. These include adequate separation of proposed development areas from freeways and arterials, construction of sound barriers, installation of landscape noise buffers, installation of noise insulation in residential units and other design techniques, and coordination with local city and county general plans. Existence of these mitigation measures could reduce the noise impacts to a less than significant level. On the other hand, in situations where highway noise is not sufficiently buffered, unavoidable significant impacts may occur.	SU

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Noise generated by construction of new transit lines and other transportation improvements (TCMs 3, 4, 5, 7, 8 and 9) would cause short-term, local impacts on ambient noise levels.	S	Construction adjacent to sensitive receptors (residences, hospitals, etc.) would be limited by contract in conformance with local regulations. Local planning authorities would also consider limiting, by contract, construction on weekends or federal holidays. Construction equipment would be required to be muffled or controlled.	SU
TCMs 4, 5, and 6 would encourage the use of new rail transit. Localized noise impacts would occur in areas adjacent to the rail lines, if ambient noise levels would exceed local or State noise standards or if the adjacent areas are currently designated as noise-impacted.	S	Mitigation measures include adequate separation of proposed development areas from rail lines, construction of sound barriers, installation of landscape noise buffer, installation of noise insulation in residential units and other design techniques, and coordination with local city and county general plans.	LS
Noise generated by construction of high-density housing (TCM 18) would result in a short-term, localized, significant noise impact.	S	See mitigation measure above.	SU
TCM 18 would encourage high density zones at transit stations. The concentration of residential and transit land uses would result in increased noise exposure for sensitive receptors and would cause a significant impact if noise levels exceed local or State noise standards.	S	Residential units sited in areas that may potentially be exposed to noise levels greater than the local or State Land Use Compatibility Standards would require a more detailed noise analysis prior to construction. Building types identified in the local or State Land Use Compatibility Standards would be located or architecturally designed so the interior noise level would not exceed 45 CNEL with the windows closed. Potential noise impacts would be evaluated as part of the design review for all projects. If determined to be significant, mitigation measures would be identified and alternatives suggested. As a minimum, all multi-family housing would comply with Title 24 of the California	LS

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LS = Less than Significant
B = Beneficial
SU = Significant Unavoidable

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Administrative Code, requiring indoor noise levels not exceed 45 dBA CNEL.	
Implementation of Urban Bus System Electrification would result in decreased ambient noise levels.	B	None recommended or required.	B
Implementation of certain stationary source control measures may result in additional pollution control devices that generate noise. This would be a significant noise impact if noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.	S	Where necessary to comply with local noise standards, outdoor, noise generating, pollution control equipment would be muffled by sound attenuating devices or separated from sensitive receptors by sound walls.	LS
4.12 CULTURAL RESOURCES			
Implementation of the following control measures -- TCM 3, 4, 5, 7, 8, and 9 -- may involve construction within areas of significant cultural or historical value, or in areas with previously undiscovered archaeological sites.	S	To determine the existence of cultural resources at potential development sites, and to weigh the significance of such resources, site surveys and records checks would be conducted as part of project environmental review. On the basis of this information, areas found to contain valuable resources would be developed in a manner designed to preserve the resources to the extent feasible. Alternatively, consideration would be given to relocating projects which conflict with significant cultural or historical resources to different sites where adverse cultural impacts will be reduced or will not occur. Site surveys and records checks as well as avoidance or limitation of archaeological impacts will be performed in conformity with the guidelines contained in Appendix K of the CEQA Guidelines. Such conformity would entail, but not be limited to, preparing an excavation plan and securing payments for the costs of mitigating effects on important archaeological resources.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Changes in land use policies associated with implementation of TCM 18, "High Density Zones at Transit Stations," may entail development that affects areas of neighborhood or ethnic cultural or historical value.	S	Local planning agencies should include preservation of cultural resources as a criterion in evaluating areas at transit stations for high-density zoning.	LS
4.13 VISUAL QUALITY AND AESTHETICS			
Both mobile and stationary source control measures would decrease air pollutant emissions and smog, thereby improving air quality and increasing visibility. The region's features would be visible more often and for a greater duration as combustion emissions decrease.	B	None recommended or required.	B
The addition of HOV Lanes (TCM 8) could result in adverse visual impacts if trees, landscaping, medians or soundwalls are removed to accommodate widened roadways. New soundwalls constructed along freeways could also result in adverse visual effects if view obstruction from adjacent land uses occurs.	S	Visual features such as trees, landscaping, planted medians and soundwalls should be inventoried and evaluated for visual importance during environmental review of an HOV lane or rail project. Wherever possible, visually important features would be retained. Trees, shrubs and groundcover should be replaced by fast-growing species that are tolerant of the freeway conditions. A maintenance program should be designed and implemented to ensure survival of the plantings.	SU
The construction of rail extensions (TCM 4) and rail access improvements (TCM 5) could result in adverse visual impacts if design, construction or operation of new systems resulted in substantial visual change, incompatible land uses, conversion of open space lands, removal of vegetation, and/or obstruction of views.	S	Proposed improvements would be subject to separate local and regional environmental review procedures, depending upon jurisdictional requirements. Projects may be subject to review by design or planning commissions, city or community councils, and public works departments.	SU

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Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Electrification of the urban bus system would result in adverse visual impacts if the system utilized overhead wires.	S	In extremely sensitive visual areas, buses that operate on dual power sources (electric and fuel) in order to eliminate overhead wires.	SU
Decreasing use of private motor vehicles may result in visual impacts as vehicles are abandoned or parked for long periods of time.	LS	Surface parking lots and parking garages should be converted to other uses such as urban parks or building opportunity sites. Subsequent development would be subject to environmental review to minimize visual impacts. Abandoned vehicles should be towed after local parking authorities determine that the vehicle has been abandoned. Wrecking yards would be screened from view by walls, fences, landscaping or combinations of these.	LS
Local visual quality could be affected as trip reduction measures de-emphasize regional employment and commercial centers and result in an intensification of urbanized land uses in satellite areas or near transit centers.	S	During CEQA review and architectural review by local governments, design guidelines which direct building height, massing, setbacks, stepbacks, sunlight penetration and building materials should be applied to new residential housing or regional employment nodes that are constructed as a result of implementation of the CAP.	LS

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TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
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3. PROJECT DESCRIPTION

3. PROJECT DESCRIPTION

3.1 PROJECT LOCATION

The project location may be loosely defined as the San Francisco Bay Area. More specifically, the project boundary is coincident with the jurisdictional boundaries of the Bay Area Air Quality Management District (BAAQMD). This area, known as the Bay Area air basin, encompasses seven entire counties, parts of two other counties and 98 cities. The counties are Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara and portions of western Solano and southern Sonoma.[1] Figure 3-1 presents the geographical boundaries of the project.

The Bay Area is known for its great physical and cultural diversity. It covers 5,600 square miles, or 3.6 million acres, of which a little over 14 percent has been developed.[2] Approximately 6 million people inhabit the Bay Area, living in approximately 2.3 million homes and employed at 3 million jobs. The Pacific Ocean, San Francisco Bay, the coastal mountain ranges and inland valleys are among the more prominent features that make the Bay Area one of the most beautiful and unique locations in the world.

The climate and physical features of the Bay Area in combination with the emissions from natural and human activities result in the buildup of pollutants in the atmosphere, causing periodic exceedances of air quality standards. The combination of the amount of emissions generated and the natural factors acting on those emissions to disperse the pollutants or allow them to accumulate is referred to as the atmospheric pollution potential. The sheltered inland valleys of the Bay Area, with their tendency for light winds, atmospheric stability, abundant sunshine and high summer and low winter temperatures, have a high air pollution potential. Coastal areas, which experience less atmospheric stability, less sunshine, higher wind speeds and more moderate temperatures, have a lower air pollution potential.

3.2 BACKGROUND

The Clean Air Plan (CAP) is the most recent and broadest regional plan addressing air quality concerns in the Bay Area. Regulation of air quality in the Bay Area has a long history, dating

back to the mid-1950s. Prior to the CAP, preparation of air quality attainment plans was required only under the federal Clean Air Act. The CAP is the first air quality attainment plan for the Bay Area in response to a State Clean Air Act. Planning for healthful air in the Bay Area may be viewed as an ongoing and continuous process. Meeting the attainment goals of the federal Clean Air Act contributes to progress toward attainment of State goals. Similarly, State planning efforts will accelerate attainment of federal goals. Some elements of the CAP originated in past federal requirements; many are refined to address requirements of the State Clean Air Act. The CAP creators are the regulatory agencies of the Bay Area responsible for air quality planning. A discussion of regional, State and federal air quality planning is, therefore, crucial to understanding the role of the CAP.

REGIONAL

In 1955, the California Legislature established what is today known as the Bay Area Air Quality Management District (BAAQMD). The BAAQMD, governed by a 20-member Board of Directors, has the power to develop and enforce regulations to control air pollution in the Bay Area. The BAAQMD has permit authority over all stationary sources of air pollutants and acts as the primary reviewer of air quality issues in environmental documents. Planning for the attainment and maintenance of federal air quality standards in the Bay Area has been the joint responsibility of the BAAQMD, the Association of Bay Area Governments (ABAG), and the Metropolitan Transportation Commission (MTC). The three agencies have prepared two Air Quality Plans, in 1979 and 1982, to address requirements of the federal Clean Air Act. The 1991 Clean Air Plan, unlike the previous plans, was prepared in response to requirements of the California Clean Air Act (CCAA), and primary responsibility rests with the BAAQMD. ABAG and MTC did assist in the preparation of the CAP, however, especially in the carbon monoxide and TCM portions of the Plan.

The 1979 Bay Area Air Quality Plan (AQP) projected attainment of federal ozone and CO standards by 1985 and contained four major elements: use of available control technology on existing stationary sources; new source review for proposed stationary sources; motor vehicle inspection and maintenance (I&M); and transportation system improvements. The 1979 AQP was revised in 1982 to comply with a Clean Air Act option for an extension to a 1987 attainment target. Other factors leading to the 1982 revision of the AQP included enactment of I&M leg-

islation, improvements in the data base and models used to forecast future air quality, and improving the rules related to new source review and use of available control technologies, which were less effective than had been anticipated in the 1979 AQP.

The 1982 AQP set forth separate control measures to reduce ozone and CO, and further divided these control measures into primary regulations, to be implemented immediately, and contingency measures, to be adopted if primary control measures did not show reasonable further progress toward attainment. The 1982 AQP contained five major elements: the motor vehicle I&M program, the Gasoline Conservation Awareness Program (GasCAP), stationary source control measures, Transportation Control Measures (TCMs), and administrative programs for long-term maintenance. The 1982 AQP projected attainment of national ambient air quality standards for CO and ozone by 1987 and their maintenance below the standards through the year 2000.

After an attainment plan is adopted, the BAAQMD Board of Directors adopts and enforces regulations in accordance with the attainment plan. The rules and regulations must be passed by a majority of the Directors. Public hearings are required prior to the adoption or amendment of rules and regulations. The stationary source rules and regulations adopted in accordance with the 1982 AQP and subsequent regulations are divided into 12 divisions:

- Regulation 1 - General Provisions and Definitions
- Regulation 2 - Permits
- Regulation 3 - Fees
- Regulation 4 - Air Pollution Episode Plan
- Regulation 5 - Open Burning
- Regulation 6 - Particulate Matter and Visible Emissions
- Regulation 7 - Odorous Substances
- Regulation 8 - Organic Compounds
- Regulation 9 - Inorganic Gaseous Pollutants
- Regulation 10 - New Plant Performance and Emission Requirements
- Regulation 11 - Hazardous Pollutants
- Regulation 12 - Miscellaneous Standards of Performance

Reduction in ozone precursors is predominately embodied in Regulation 8, which contains 50 rules to limit the emission of organic compounds into the atmosphere. The BAAQMD also publishes a Manual of Procedures, which describes source testing, laboratory and enforcement procedures to be used by the BAAQMD staff and industry to determine whether stationary source regulations are being met.

The 1991 Clean Air Plan is being prepared as required by the CCAA. The 1991 CAP incorporates many of the control measures previously established in the 1979 and 1982 AQPs, removing exemptions contained in some measures, improving some measures and adding new control measures. Under the directives of the CCAA, the BAAQMD is responsible for the development, adoption, and implementation of the CAP. Implementation of some of the control measures proposed in the CAP may be delegated to other local agencies by the BAAQMD. In the case of the CAP, the preparation has been undertaken by three regional agencies: the BAAQMD, ABAG and MTC. The BAAQMD is responsible for all plan elements and control measures dealing with non-vehicular sources of air pollution. ABAG prepares population and employment projections used as a basis for the CAP. As required by Assembly Bill 3971 (Cortese, 1988), MTC and the BAAQMD are responsible for developing transportation control measures for the CAP.

STATE

The State Bureau of Air Sanitation first identified air pollution levels that could endanger public health in 1955. Emissions from cars and trucks were recognized as the major source of smog-forming air pollutants. To combat this pollution, the State formed the Motor Vehicle Pollution Control Board (MVPCB) in 1959. The adoption of the Mulford-Carrell Act (SB490) in 1967 merged the MVPCB and the Bureau of Air Sanitation to create the Air Resources Board (ARB). The ARB coordinates and oversees both State and federal air pollution control programs in California, including the review and approval of attainment plans. As part of this responsibility, the ARB monitors existing air quality, establishes State air quality standards (which in many cases are more stringent than federal standards, as shown in Table 3-1), limits allowable emissions from vehicular sources, administers grants to local districts, and is responsible for overseeing the State Implementation Plan (SIP) to meet federal Clean Air Act requirements. The SIP is a compilation of air quality plans prepared by air quality districts throughout the State. The State air quality

TABLE 3-1

FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS[1]

Pollutant	Averaging Time	California Standard[3]	Federal Standards[2] Primary[4]	Secondary[5]
Ozone	1-hour	0.09 ppm (180 ug/m^3)	0.12 ppm (235 ug/m^3)	0.12 ppm (235 ug/m^3)
Carbon Monoxide	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide	1-hour	0.25 ppm (470 mg/m^3)	--- ---	--- ---
	Annual Average	--- ---	0.053 ppm (100 ug/m^3)	0.053 (100 mg/m^3)
Sulfur Dioxide	1-hour	0.25 ppm (655 mg/m^3)	--- ---	--- ---
	3-hour	--- ---	--- ---	1300 ug/m^3 (0.5 ppm)
	24-hour	0.05 ppm[6] (131 ug/m^3)	365 ug/m^3 (0.14 ppm)	--- ---
	Annual Average	--- ---	80 ug/m^3 (0.03 ppm)	--- ---
Suspended Particulate Matter (PM_{10})	24-hour	50 ug/m^3	150 ug/m^3	150 ug/m^3
	Annual Geometric Mean	30 ug/m^3	---	---
	Annual Arithmetic Mean	---	50 ug/m^3	50 ug/m^3
Sulfates	24-hour	25 ug/m^3	---	---
Lead	30 Day Average	1.5 ug/m^3	---	---
	Calendar Quarter	---	1.5 ug/m^3	1.5 ug/m^3
Hydrogen Sulfide	1-hour	0.03 ppm (42 ug/m^3)	--- ---	--- ---
Vinyl Chloride	24-hour	0.010 ppm (26 ug/m^3)	--- ---	--- ---
Visibility-Reducing Particles	1 Observation	Visibility < 10 miles[7]	---	---

TABLE 3-1 (Continued)

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[1] Concentrations expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius and a reference pressure of 760 mm of mercury. Note: ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas. ug/m^3 = micrograms per cubic meter.

[2] National Standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

[3] California standards for ozone, carbon monoxide, sulfur dioxide (1 hour), nitrogen dioxide and particulate matter (PM_{10}), are values that are not to be exceeded. The sulfates, lead, hydrogen sulfide, vinyl chloride, and visibility-reducing particles standards are not to be equaled or exceeded.

[4] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency.

[5] National Secondary Standards: the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.

[6] At locations where the State standards for ozone and/or suspended particulate matter are violated. National standards apply elsewhere.

[7] Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

Source: California Air Resources Board.

standards shown in Table 3-1 were established in order to protect sensitive people from adverse health effects as indicated in Table 3-2.

In 1988, the California Clean Air Act (CCAA), Assembly Bill 2595 (Sher) was passed, identifying air quality goals, planning mechanisms, regulatory strategies, and standards of progress. The goal of the CCAA is to attain the State ambient air quality standards by the "earliest practicable date." Air districts that have not attained the State standards for ozone, carbon monoxide (CO), sulfur dioxide (SO_2), or nitrogen dioxide (NO_2) are required to prepare attainment plans by June 30, 1991, with updates to the plans occurring in three-year intervals. Under the CCAA, the ARB is required to adopt more stringent emission controls for fuels, consumer products and mobile sources, including motor vehicles, marine vessels, locomotives, utility engines and farm and construction equipment.

The ARB's role in the preparation of the CAP includes review and approval, guidance and technical assistance, and development of emission reduction control measures to be incorporated into the CAP. As directed under the CCAA, the ARB is responsible for managing the statewide planning efforts to achieve and maintain State ambient air quality standards, including designating nonattainment areas, reviewing and approving attainment plans (e.g., the CAP), ensuring coordination and consistency between attainment plans, monitoring progress toward attainment of the standards, and monitoring compliance with specific CCAA requirements. ARB provides guidance and technical assistance to the districts preparing attainment plans by directing emission inventory, monitoring and modeling; evaluating methods of gauging air quality improvements; and assessing air pollutant transport between nonattainment areas. The types of control measures developed and implemented by the ARB, and incorporated in the CAP, include motor vehicle standards and programs, consumer product measures, the clean fuels program, and emission controls for marine vessels, locomotives, utility engines, and farm and construction equipment.

The CCAA provides two submittal dates for attainment plans. Nonattainment districts must submit plans to the ARB by December 31, 1990. Districts that are either receptors or contributors of transported air pollutants have until June 30, 1991. After the plans have been adopted by their respective boards, they are forwarded to the ARB. The ARB is required to review the attainment

TABLE 3-2

HEALTH EFFECTS SUMMARY OF THE MAJOR CRITERIA AIR POLLUTANTS

Air Pollutant	Adverse Affects
Ozone	Eye irritation. Respiratory function impairment.
Carbon Monoxide	Impairment of oxygen transport in the bloodstream, increase of carboxyhemoglobin. Aggravation of cardiovascular disease. Impairment of central nervous system function. Fatigue, headache, confusion, dizziness. Can be fatal in the case of very high concentrations in enclosed places.
Nitrogen Dioxide	Risk of acute and chronic respiratory illness.
Sulfur Dioxide	Aggravation of chronic obstruction lung disease. Increased risk of acute and chronic respiratory illness.
Total Suspended Particulate	Increased risk of chronic respiratory illness with long exposure. Altered lung function in children. With SO_2, may produce acute illness.
PM_{10}	Particulate matter 10 microns or less in size (PM_{10}) which may be inhaled and possibly lodge in and/or irritate the lungs.
Sulfates	Decreased lung function. Aggravation of asthmatic symptoms, cardio-pulmonary disease.
Lead	Impairment of blood function and nerve construction. Behavioral and learning problems in children.
Hydrogen Sulfide[1]	Impairment of the body to utilize oxygen. Chronic exposure to low concentrations may result in conjunctivitis (red eye) or pulmonary edema.
Vinyl Chloride	Angiosarcoma of the liver. Possibly other cancers. Possible effects on human reproduction.

[1] Curtis D. Dlaassen, Ph.D., Mary O. Amdur, Ph.D., John Doull, M.D., Ph.D., Casarett and Doull's Toxicology, 1986.

Source: California Air Resources Board.

plans within 12 months and notify the district if any deficiencies exist in the plan. If the deficiencies cannot be resolved, the ARB can take action to amend the plans. The ARB, in approving a plan, must find that the plan would attain the State ambient air quality standards by the "earliest practicable date."

Determination of whether an air district is identified as attainment or nonattainment and, therefore, required to prepare an attainment plan under the CCAA, is contained in the California Code of Regulations, Title 17, Subchapter 1.5, "Air Basins and Air Quality Standards," Article 3, "Criteria for Determining Area Designations." Based on Section 70303, "Criteria for Designating an Area as Nonattainment," the Bay Area has been designated as nonattainment for the air pollutants ozone and carbon monoxide. An area is identified as being nonattainment if at least one violation of the State ambient air quality standards, established in Section 70200 (see Table 3-1), has been "recorded based on data for the three calendar years prior to the year in which the designation is made or the annual review of the designation is conducted."

The CCAA guides the districts in preparation of attainment plans to achieve attainment by the "earliest practicable date," in a cost-effective manner, considering all relevant factors. The determination of the attainment date of the standards by the districts is subject to approval by the ARB. The ARB will also review the cost-effectiveness of attainment plans to ensure the most efficient methods of air pollution control. Attainment plans are required to rank control measures from the least to the most cost-effective. Factors to be considered in the preparation of an attainment plan include:

- Present and projected maximum ambient pollutant concentrations.
- Distribution and frequency of violations.
- Transport contributions.
- Projected emission increases based on industrial, vehicular, or population growth.
- Emission inventory characteristics.
- Anticipated effectiveness of available and potential control measures.
- Emission reductions occurring in, or expected to occur in, the district.

The CCAA requires that attainment plans include control measures sufficient to yield a five percent per year reduction in emissions, district-wide, for each nonattainment pollutant or its precursor, averaged over three consecutive years. A district may adopt a plan that reduces emissions by less than five percent per year if it can demonstrate that an alternative strategy would be equally or more effective in improving air quality than the five percent goal. Further, as in the case of the CAP, emission reductions of less than five percent per year may also be acceptable if the district could not achieve a five percent reduction in emissions with the adoption of every "feasible" measure and an expeditious adoption schedule. The percent emission reductions achieved are calculated from December 31, 1987. In the event that interim emission reductions targeted in attainment plans are not being achieved, the plans are required to contain contingency measures.

A district will be classified as either having "moderate," "serious," or "severe" air pollution for each relevant pollutant based on the estimated date of attainment. Districts classified as "moderate" will be in attainment by the end of 1994; districts classified as "serious" will achieve attainment by the end of 1997; while districts classified as "severe" will not achieve attainment before the end of 1997, or are unable to determine when attainment will be achieved. Table 3-3 presents specific CCAA requirements for districts under each classification: moderate, serious and severe. The BAAQMD has declared itself as having "severe" air pollution with regard to ozone and will, therefore, be required to satisfy all requirements in Table 3-3. With respect to carbon monoxide, the District classifies itself as "serious," with attainment expected by 1997.

Attainment plans are required to be updated every three years after ARB approval and, if necessary, amended to correct for deficiencies in meeting interim goals. To determine if interim goals are being achieved, the districts are required to assess the emission reductions achieved over the past three years and determine if emission reductions anticipated in the plan are being met. Districts are also required to publish annually a list of regulatory measures scheduled for adoption in the following year and a separate report identifying progress in developing, adopting or implementing control measures in the plan. Districts not achieving the standards by 1998 would be required to prepare another comprehensive plan with plan updates occurring every three years thereafter.

As previously noted, AB 3971 (Cortese, 1988), a State-mandated local program, set forth a procedure for the Bay Area to develop transportation control measures for the attainment of State

TABLE 3-3
CALIFORNIA CLEAN AIR ACT REQUIREMENTS
FOR AIR QUALITY MANAGEMENT DISTRICTS CLASSIFIED
MODERATE, SERIOUS AND SEVERE

Moderate

1) Permitting program designed to achieve no net increase in emissions of nonattainment pollutants or their precursors for new or modified sources which emit or have the potential to emit 25 tons per year or more of nonattainment pollutants or their precursors.

2) Reasonably available control technology for all existing sources.

3) Reasonably available transportation control measures.

4) Provisions to develop areas sources and indirect source control programs.

5) Provisions to develop and maintain an emissions inventory system to enable analysis and progress reporting and a commitment to develop other analytical techniques to carry out its responsibilities pursuant to the attainment plan.

6) Provisions for public education programs to promote actions to reduce emissions from transportation and areawide sources.

Serious

1) All measures required for moderate nonattainment areas.

2) A permitting program designed to achieve no net increase in emissions of nonattainment pollutants or their precursors from all permitted new or modified stationary sources.

3) Transportation control measures to substantially reduce the rate of increase in passenger vehicle trips and miles traveled per trip.

4) A requirement for the application of the best available retrofit control technology to existing stationary sources.

Severe

1) All measures required for moderate and serious nonattainment areas.

2) Transportation control measures to achieve an average (during weekday commute hours) of 1.5 or more persons per passenger vehicle by 1999, and no net increase in vehicle emissions after 1997.

3) Measures to achieve the use of a significant number of low-emission motor vehicles by operators of motor vehicle fleets.

4) Measures sufficient to reduce overall population exposure to ambient pollutant levels in excess of the standard by at least 25 percent by December 31, 1994, 40 percent by December 31, 1997, and 50 percent by December 31, 2000, based on average per capita exposure and the severity of the exceedances, so as to minimize health impacts, using the average level of exposure experienced during 1986 through 1988 as the baseline.

Source: CCAA

air quality standards. The intent of AB 3971 is to "improve traffic congestion and air quality in the San Francisco Bay Area by implementing transportation control measures that reduce vehicle trips, vehicle use, vehicle miles traveled, and vehicle idling." The bill directs the BAAQMD, MTC, ABAG, local entities, and employers to work in cooperation to develop and adopt a plan to control emissions from transportation sources that would attain and maintain State and federal ambient air quality standards.

Credit for emission reductions from control measures adopted by the ARB since 1987 account for a portion of the emission reductions in the CAP. In addition to these emission reductions, control measures to be adopted in 1991 and 1992 and beyond constitute ongoing efforts by the ARB to help air districts attain the standards. Table 3-4 provides a list of adopted and proposed mobile source measures by the ARB which are included in the emission reductions of the CAP.

FEDERAL

The federal government entered the field of air pollution control in 1955 with the Air Pollution Control Research and Technical Assistance Act, providing no regulatory authority. This was followed in 1963 by legislation that granted federal regulatory authority to hold abatement conferences to exert pressure on polluters in specific areas of the nation. In 1967 the first Air Quality Act was passed. The implementation of the 1967 Air Quality Act did not result in substantial improvement in the nation's air quality.

The 1970 Clean Air Act, with substantially more regulatory authority than the previous acts, gave the U.S. Environmental Protection Agency (EPA) the authority to set federal ambient air quality standards. The Act indicated the need for primary standards to protect public health and secondary standards to protect public welfare from effects such as visibility reduction, soiling, nuisance, and other forms of damage. It also required that the federal standards be designed to protect those people most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by illness, and persons engaged in strenuous work or exercise (all termed "sensitive receptors").

In 1971, the EPA established federal standards for five major criteria air pollutants: photochemical oxidants (ozone), carbon monoxide (CO), suspended particulate matter (originally the standard

TABLE 3-4
CALIFORNIA AIR RESOURCES BOARD
MOBILE SOURCE CONTROL MEASURES

Adopted since 1987.

1) Regulations for low-emission vehicles and clean fuels.
2) Improved inspection/maintenance ("Smog Check").
3) On-board diagnostic systems.
4) Certification procedures for after-market catalytic converters.
5) Revised in-use vehicle recall regulations.
6) Amended emission control system warranty requirements and standardized nomenclature.
7) Revised light-duty after-market parts program.
8) Heavy-duty vehicle (i.e., truck diesels) smoke enforcement program.
9) New direct import vehicle certification regulations.
10) Used direct import vehicle certification regulations.
11) Revised emission standards for gas and diesel-powered heavy-duty engines.
12) 0.4 grams/mile NO_x emission standard for light-duty vehicles.
13) Lower HC and CO standards for light-duty vehicles.
14) New diesel fuel quality standards.
15) Revised emission standards and test procedures for medium-duty vehicles and light-heavy-duty-engines.
16) Revised evaporative emission test procedures.

Feasible measures for 1991 and 1992.

1) Enforcement of emission standards, especially for alternative fuel retrofit systems.
2) Broader and tougher emission standards for new vehicles and engines, including utility engines, construction and farm equipment, off-road motorcycles, off-highway vehicles, and marine vessels.
3) New gasoline specifications - Phase 2.

Feasible measures for after 1992.

1) Further enhancements to the improved "Smog Check" program.
2) Inspection and maintenance for light-duty diesel vehicles.
3) Inspection of fleet heavy-duty trucks.
4) Heavy-duty bus particulate trap retrofits.
5) Retrofit/operational requirements for trains.
6) Control of off-cycle emissions.
7) Low emission vehicle standards for heavy-duty engines.
8) Fleet average standards for post-2003 model years low emission vehicles.

Source: 1991 CAP

applied to particulates of any diameter, termed total suspended particulates or TSP, but the standard was changed in 1987 to apply only to particulates less than 10 microns in diameter (termed PM_{10}), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2).[3] The federal and State standards, given in Table 3-1, provide acceptable concentrations for specific contaminant levels in order to protect sensitive receptors from adverse effects as indicated in Table 3-2.

The 1977 Clean Air Act Amendments (passed after many states failed to meet the five-year deadline for achieving the federal standards) required that each state identify areas within its borders that did not meet federal primary standards (i.e., nonattainment areas) and devise a State Implementation Plan (SIP), subject to EPA approval, that would guarantee attainment no later than the end of 1987. The Clean Air Act Amendments did not specify what course of action would be undertaken by the EPA if states failed to meet the 1987 attainment deadline. After the year 1987, many states, including California, were required to implement EPA interim policies. The passage of the amended federal Clean Air Act in November 1990 will once again provide guidelines to be followed by states to meet National Ambient Air Quality Standards.

The amended 1990 federal Clean Air Act is divided into six basic sections:

Title I: Attainment and Maintenance of National Ambient Air Quality Standards. Implements stringent permitting and pollution control measures to meet new standards and deadlines for VOCs, NO_x, CO, PM_{10}, SO_2, and lead. Requires major new sources, in specified locations, to use Best Available Control Technology (BACT) and provide 100 to 150 percent offsets for increased emissions.

Title II: Mobile Sources. Requires vapor recovery during gasoline refueling, sets stricter vehicle emission standards and limits volatility of gasoline. Mandates the sale of a limited number of clean fuel vehicles (operating on oxygenated fuels and methanol and ethanol blends) and provides for the supply and distribution of these fuels to consumers.

Title III: Hazardous Air Pollutants. Requires the EPA to establish maximum available control technology (MACT) for new and existing sources emitting more than 10 tons per year of any one of the 189 pollutants identified in the CAA.

Title IV: Acid Rain Controls. Lists 700 utility and industrial boilers required to reduce SO_2 by 10 million tons and NO_x by 2 million tons annually from 1980 levels, by 1995.

Title V: Permits. Establishes more stringent operating permit requirements including enforceable emissions limitations, compliance schedules, inspections, entry and

monitoring requirements, compliance certification and violation reporting procedures. All major sources would be required to be repermitted with new permits subject to review and renewal every five years.

Title VI: Stratospheric Ozone Protection. Regulates ozone-depleting substances through requirements to reduce production, increased use of substitutes to ozone-depleting substances and penalties for noncompliance. Requires the EPA to produce a list of ozone-depleting substances to be banned by the year 2000, in the spring of 1991.

Monitoring data for 1990 shows that occasional violations of the federal ozone and eight-hour CO standards (i.e., two days per year over the standard for ozone, and two days per year over the standard for CO) are still being measured in the Bay Area. As a result of these measurements, the BAAQMD will not be able to declare regional attainment for ozone or carbon monoxide. Because of these violations, the BAAQMD will have to propose and implement additional emission control strategies and estimate a new attainment date in order to satisfy the EPA.

The CAP is designed to meet the requirements of the California Clean Air Act, not the 1990 federal Clean Air Act Amendments. EPA is expected to release guidance for preparing attainment plans to meet the requirements of the 1990 Amendments in November 1991. Because the State ozone standard is more stringent than the federal standard, it is likely that the emission reduction strategies in the CAP will satisfy federal requirements.

3.3 PURPOSE AND OBJECTIVES OF THE 1991 CLEAN AIR PLAN (CAP)

The purpose of the 1991 Clean Air Plan is to achieve and maintain State ambient air quality standards by the earliest practicable date. The objective is to make progress toward the carbon monoxide and ozone standards by reducing emissions at a rate of five percent per year or by implementing all feasible control measures. Both the purpose and the objectives of the CAP are in accordance with the requirements of the CCAA.

Although the Bay Area is many years away from achieving the State air quality standards, it has made major advancements toward that goal. The State air quality standards, presented in Table 3-1, are health-based standards established to protect public health, particularly of children, older people, and individuals with respiratory diseases. These standards were established by the ARB,

in conjunction with the California Department of Health Services. The Bay Area has failed to attain State ambient air quality standards for ozone and carbon monoxide, although there has been progress. As shown in Figures 3-2 and 3-3, exceedances of the ozone and CO standards and maximum recorded values have steadily declined.

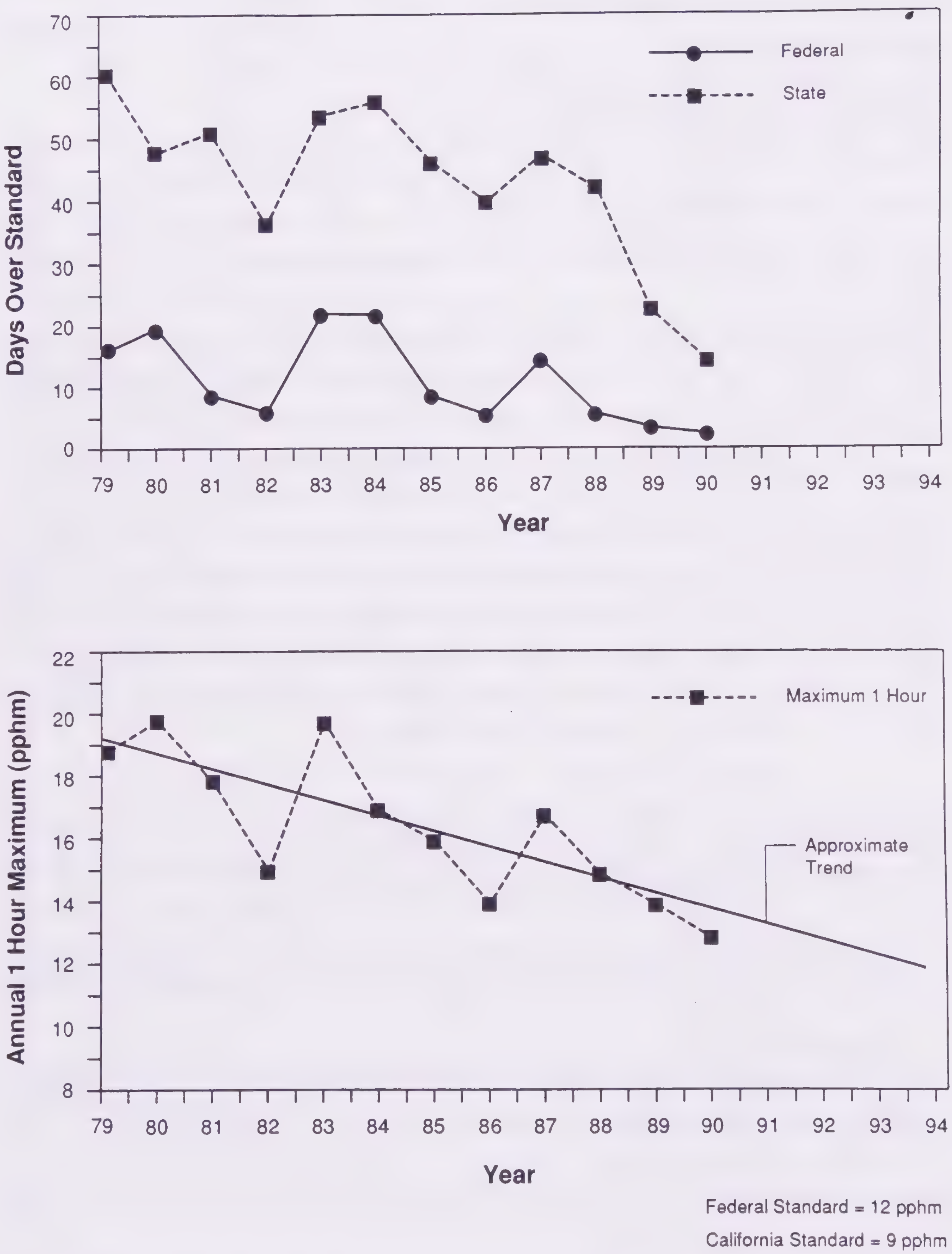
While emissions in the Bay Area have steadily declined, Figures 3-2 and 3-3 show major fluctuations in the number of exceedances occurring each year. These fluctuations are the result of changes in the meteorology that occur from year to year. These changes make it very difficult to determine exactly when attainment of the standards will be achieved.

Computer modeling has been used for many years in Bay Area planning for attainment of the ozone standard. Currently the BAAQMD uses the Urban Airshed Model to determine future levels of ozone. Among the inputs to the model are emission inventory projections, air quality monitoring data, ozone photochemistry and the Bay Area meteorology. The emissions inventory projections identify the sources of ozone precursors based on ABAG projections in population, employment, housing and land use patterns; MTC projections providing mobile source emissions by location, trip type, time and mode; and emissions from other commercial and industrial sources. Reductions from control measures are applied to these emission inventories to determine the net emissions. After the model has been validated by comparing the results from the computer simulation against monitored results, the model can be used to forecast future air quality and determine the potential effects of proposed control measures.

Extensive ozone modeling was conducted to determine what emission reductions would be required and when attainment of the ozone standards could be achieved. The computer modeling explored the relative merits of a number of different ozone strategies listed below.

- o Reducing hydrocarbons, a precursor of ozone, results in a reduction in ozone; however, these reductions are non-linear with increasingly greater reductions in hydrocarbons required for each successive lowering of the ozone level.

- o Reducing nitrogen oxides, a precursor of ozone, will reduce ozone levels throughout most of the Bay Area but would create "hotspots" where ozone levels would remain relatively high.



SOURCE: BAAQMD (1991)

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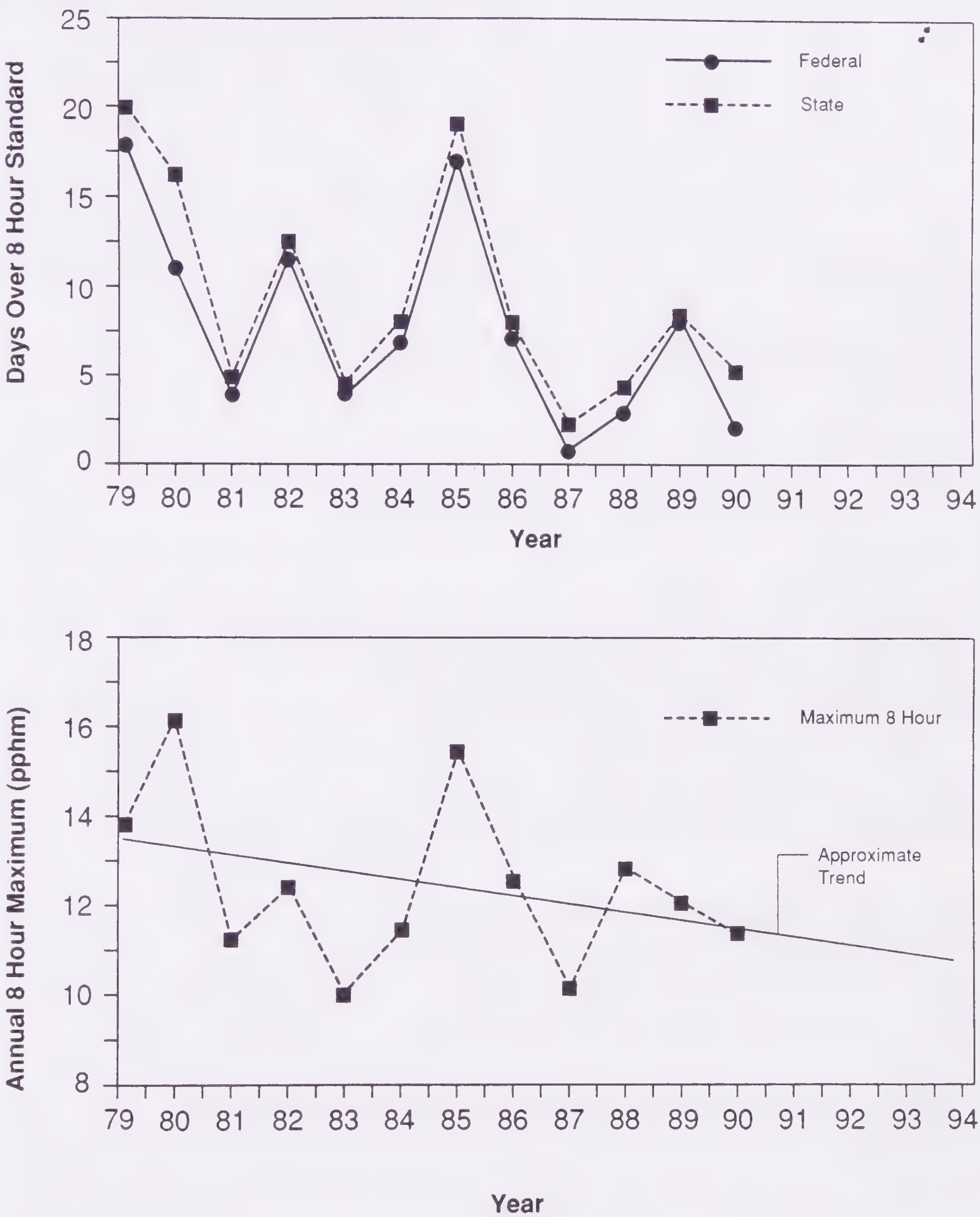

SOURCE: BAAQMD (1991)

91005

- o Combined hydrocarbon and nitrogen oxides control measures would also reduce ozone levels. Similar to reducing hydrocarbons alone, reductions in both ozone precursors would result in less than an equivalent reduction in the ozone level.

- o Finally, emission reductions of as much as 75 percent for either ozone precursor, or both, may be required to attain the State ozone standard.

Because a practical strategy for achieving a 75 percent reduction in ozone precursors cannot be achieved by 1997, the Bay Area cannot demonstrate attainment of the State ozone standard by 1997. Nevertheless, the CCAA requires progress toward the standard through five percent per year reduction in emissions, or implementation of all feasible measures. The CAP ozone strategy is to implement all feasible measures, which will result in approximately three percent per year emission reductions of HC and NO_x. The BAAQMD's determination of feasibility of a measure will be subject to ARB approval. The determination was based on technical and economic analysis, ARB guidance, comparison with programs in other areas with comparable air quality problems, and overall judgements of implementability.

Predicting attainment of carbon monoxide, compared to ozone, is much simpler because carbon monoxide is a non-reactive pollutant for which emission levels are linearly related to ambient concentrations. Exceedances of the State carbon monoxide standard have only occurred in three sub-areas of the Bay Area between the years 1987 and 1989: San Francisco, San Jose and the City of Vallejo. The BAAQMD has calculated that San Francisco would need to reduce CO emissions by 10 percent, San Jose by 25 percent and Vallejo by 22 percent to attain the State standards. Attainment of the State CO standard is expected to be achieved by the mid-1990s.

The CAP must meet the State air quality standards by the earliest practicable date. To achieve this goal, the BAAQMD would need to determine which control measures should be adopted and in what order. Because the BAAQMD has determined that it is unable to meet the five-percent-per-year emission reductions required under the CCAA, it must adopt all "feasible" control measures. The CCAA requires that the districts prepare an adoption and implementation schedule to achieve the State standards based on the "cost-effectiveness of the measure as well as other factors including, but not limited to, technological feasibility, total emission reduction potential, the rate of reduction, public acceptability, and enforceability."[4] These criteria would establish the order in which measures were adopted.

The CAP provides proposed adoption dates for stationary sources and divides the adoption of mobile source control measures into three phases. Periods of adoption for stationary control measures are from 1991 to 1994, 1995 to 1997, 1998 to 2000 and after the year 2000. These dates coincide with the CCAA requirements to prepare a triennial analysis of the attainment plans. Adoption of measures to reduce emissions through transportation controls are proposed to be carried out in three phases:

- Phase 1: Reasonably Available TCMs that are based on existing authority and funding;
- Phase 2: Additional Mobility, Traffic Operations and Incentive Package, which requires new legislative authority and funding; and
- Phase 3: Market Based TCMs, which also require authorizing legislation, except parking management.

These phases also coincide with the triennial attainment plan reviews, with Phase 1 control measures to be adopted by 1994, Phase 2 by 1997 and Phase 3 adopted after 1997.

3.4 DESCRIPTION OF THE 1991 CLEAN AIR PLAN

The Clean Air Plan consists of two documents, the Draft Bay Area '91 Clean Air Plan (CAP): Implementing All Feasible Measures, (April 1991) and the Addendum to the Draft Bay Area '91 Clean Air Plan (CAP), (June 18, 1991). The first of these documents is divided into 13 chapters.

1. Summary. This chapter discusses the need for cleaner air, regulatory requirements, past progress, and possible social and economic effects of further emission reductions resulting from the CAP.

2. Why an Air Quality Plan Is Needed. This chapter discusses the following issues:
   - The need for air quality standards to protect public health and welfare.
   - Federal regulatory history, Bay Area plans prepared in response to federal requirements and progress toward meeting the federal standards.
   - Passage of the CCAA and requirements to prepare the CAP.

3. The Bay Area's Air Quality Today. This chapter identifies:
   - Historical trends of ozone and carbon monoxide exceedances and maximum concentrations.
   - Emission sources of ozone precursors and carbon monoxide and the factors determining the potential for these pollutants to result in exceedance of the standards.

4. What If Nothing Is Done? Contains the following subchapters:
   - *Improvements in Control Technology* -- describes the role of technical control measures for both stationary and mobile sources
   - *Transportation Control Measures* -- addresses the need to reduce mobile emissions by reducing vehicle miles traveled
   - *Future Air Emissions* - projects emissions of pollutants in the future if no new regulations were adopted by the BAAQMD; commonly referred to as the "baseline."

5. Forecasting Future Air Quality. This chapter discusses:
   - The complexities and methodologies of projecting ambient concentrations of ozone and carbon monoxide.
   - *The Computer Modeling Process* - describes the inputs and outputs of the ozone model (Urban Airshed Model) with respect to emission reduction of ozone precursors in the Bay Area.

6. Tomorrow's Air Quality With Today's Controls. This chapter quantifies:
   - Improvements in air quality in the Bay Area with no additional control measures adopted for both ozone and carbon monoxide.

7. California's "Severe Area" Designation. This chapter describes:
   - The designation of air pollution in air basins as "moderate", "serious" and "severe" and the related regulatory requirements under the CCAA.
   - Identifies the air pollution in the Bay Area as severe.

8. Controls Needed to Satisfy "Severe Area" Requirements. This chapter discusses the need for a comprehensive strategy to reduce emissions.

9. What Can Be Done to Clean Up the Air. This chapter presents an extensive list of emission reduction options from which those selected in the CAP were chosen.

10. Sorting Through the Clean Air Options. This chapter provides the criteria by which control measures presented in Chapter 9 were selected.

11. A Bay Area Proposal. This chapter presents the proposed control measures chosen to meet the CCAA requirements for attainment plans divided into stationary source control measures and transportation control measures.

12. The Benefits and Costs. This chapter discusses the potential benefits of clean air such as improved health, welfare and quality of life and the difficulties in quantifying these benefits. Based on the costs of implementing past plans, the cost of implementing the control measures in the CAP is expected to be substantial.

13. Other Issues. Subchapters contained in this chapter include:
   - *Transport Mitigation*. This subchapter deals with the ability of the CAP to meet the CCAA requirements to reduce the transport of pollutants to adjacent regions.

- *Hydrocarbon and Nitrogen Oxides Controls*. This subchapter discusses the merits of control measures to reduce ozone by reducing hydrocarbons alone against reducing both hydrocarbons and nitrogen oxides in light of the CCAA requirements.
- *Alternative Indicators*. This subchapter discusses the use of alternative indicators, allowed under the CCAA, to develop control plans showing improvements in air quality at a faster rate than improvements that could be achieved using the five percent per year emission reduction strategy.
- *Alternative Strategies*. This subchapter discusses the allowable CCAA alternative emission reduction strategy for alternatives that are equal to or more effective than what would be achieved through the five percent per year emission reduction strategy.
- *Contingency Measures*. This subchapter discusses the how the CAP would meet the CCAA requirements for contingency measures.
- *Federal Clean Air Act Amendments of 1990*. This subchapter discusses the ability of the CAP to meet requirements of the federal CAA and presents some requirements of the federal law that may be more stringent than those of the CCAA.
- *Other Pollutants*. This subchapter identifies the effects of the CAP on pollutants, other than ozone and CO, of concern in the Bay Area.
- *Energy Issues*. This subchapter briefly notes that the CAP would overall result in the conservation of energy.
- *Global Issues*. This subchapter notes that gasses resulting in global warming would be reduced by implementation of the CAP.
- *Technical Uncertainty*. This subchapter addresses many of the technical uncertainties in preparing an attainment strategy.

The Addendum to Draft Bay Area '91 Clean Air Plan (CAP) (June 18, 1991) responds to public input gained through informational meetings and reflects proposed changes and errata in the Plan. The Addendum contains the following:

- Revised Table 2, "Bay Area Emission Inventory Trends."
- Revised Table 6, "CCAA Rate of Emission Reductions."
- Revised pages for Table 8, "1991 Clean Air Plan Proposed Stationary Source Control Measures."
- Revised Table 10, "Summary of TCM Plan Emission Reductions."
- A description of the District's process for generating and selecting Plan Proposals, i.e., the control measures in the Plan.
- A description of the Transportation Control Measures
- Estimates of the emission reductions and Cost-Effectiveness of the TCMs.

The changes made to the April Draft CAP in the June Addendum include deletion of three earlier-proposed stationary source measures, a change to contingency status for one stationary and three mobile source control measures, and changes in the proposed level of control and/or implementation for five NOx control measures.

The Clean Air Plan contains measures to reduce emissions from both mobile and stationary sources. *Mobile sources* include automobiles, trucks, and buses. The term *stationary sources* refers to all other industrial, commercial, and residential sources of air pollution. Examples range from large industrial plants, such as refineries, to small commercial and residential sources, such as dry cleaners and house painting. The emissions control strategy of the CAP is contained in the stationary source control measures, listed in Table 8 of the CAP, and the transportation control measures, listed in Figure 11 of the CAP. The Addendum describes the transportation control measures in greater detail.

This EIR analysis divides the CAP measures into the two major categories, mobile and stationary emission sources. The reader should note that, for the sake of clarity and brevity, this project description does not include every aspect of each proposed control measure. For a more detailed description of the control measures, please refer to the following BAAQMD documents: 1991 Clean Air Plan, Candidate Control Measures Descriptions, June 25, 1991 (for stationary source control measures) and the '91 Clean Air Plan Addendum, June 18, 1991 (for transportation control measures).

MOBILE SOURCE CONTROL MEASURES

The Bay Area can reduce emissions from mobile sources by reducing the use of vehicles and by making the vehicles emit less pollutants per mile. The first method includes transportation control measures (TCMs) to reduce the number of vehicle trips, the length of the trips (in the aggregate, vehicle miles traveled, or VMT), and/or traffic congestion. The latter method includes motor vehicle controls to reduce emissions through low-emission vehicles and cleaner-burning fuels, improved inspection/maintenance ("smog check") program and other measures adopted by the ARB since 1987 (see Table 3-4).

The TCMs presented below were initially prepared by an MTC task force in 1989 and 1990. The group prepared a comprehensive list of possible TCMs and analyzed and screened them with respect to the potential effectiveness, cost, funding, responsibility, authority, equity and possible implementation schedule. They were adopted by MTC on November 28, 1990. The BAAQMD revised the phasing, parking fees and transportation funding allocation in MTC's TCM Plan to conform to the requirements of the CCAA and the ARB's guidance, and to constitute a workable plan.

The MTC's plan identified implementation of the TCM's in two phases: MTC's Phase 1 included both reasonably available TCMs and TCMs that require new State legislation for funding; MTC's Phase 2 consisted of market-based measures. The BAAQMD proposes in the CAP that the reasonably available TCMs be identified in a separate phase, resulting in the following three-phase implementation plan:

Phase 1: Reasonably Available TCMs
Phase 2: Substantial Improvements in Transportation Options
Phase 3: Market-Based Pricing Measures

Under MTC's plan, parking fees were to be used to fund regional mobility improvements if new State legislation for revenues from increased bridge tolls, vehicle registration fees, and gas taxes was not forthcoming. The BAAQMD proposes in the CAP that parking fees be incorporated into Phase 1 as a key option for complying with the provisions of employer based trip reduction and indirect source control rules. In addition, any revenues raised through parking fees would first be used onsite to provide incentives for ridesharing and transit use.

Finally, most of the TCMs in MTC's Plan required that transportation funds (yet to be authorized by the State legislation) be allocated by MTC. The BAAQMD proposes in the CAP that both the MTC and the BAAQMD jointly develop a legislative package for TCM funding which will include the most effective measures for improving air quality.

The mobile source control measures are summarized below. Section 4.2, Transportation, provides the assumptions used to analyze the TCMs. The mobile source control measures included in the CAP, and discussed below, have been divided into seven categories:

1. Employer-Based Trip Reduction
2. Mobility Improvements
3. Implementation Support
4. Traffic Operation Management
5. User Incentives
6. Indirect Source Review
7. Pricing Strategies

TCM 1, "Employer Assistance Programs," proposes to expand current support for Employer-Based Trip Reduction Plans. Employer programs typically consist of assistance and incentives to encourage employees not to drive alone to work. Components may include transit subsidies, facilitation of carpools, distribution of transit information, and other actions. TCM 1 proposes to expand the services provided through RIDES and other local ridesharing assistance organizations in terms of assistance to employers. This is a Phase 1, Employer-Based Trip Reduction Measure.

TCM 2, "Trip Reduction Rule," embodies several efforts to implement regionwide employer-based trip reduction programs. MTC has developed a model Trip Reduction Ordinance (TRO) for consideration by counties and cities. The menu of options includes a TCM coordinator, employee information, carpool/vanpool incentives, free or subsidized transit, guaranteed ride home programs, shuttles to transit, preferential parking for carpools/vanpools, telecommuting policies, on-site bicycle/transit/carpool facilities, and parking charges. Under Proposition 111 (June 1990), cities and counties are required to adopt a Trip Reduction Ordinance. Therefore, the MTC model TRO would provide useful guidance to local jurisdictions. Finally, the BAAQMD would develop a regionwide trip reduction rule after a rule-making process that involves affected parties. This is a Phase 1, Employer-Based Trip Reduction Measure.

The goals of TCM 3, "Area Wide Transit Service Improvements," are to increase local bus service by 33 percent, to expand rail service, and to require transit operators to undertake comprehensive route analyses. MTC funds and reviews the transit operator comprehensive service plans. Such analyses would examine markets, routes, and frequency of service, including the possibility of subscription bus service at major employment centers. Under this Mobility Improvement Measure, Phase 1 would include continuation of post-earthquake expanded BART service and expansion of CalTrain service. Phase 2 would require new revenue sources.

TCM 4, "Expand New Rail Starts," consists of MTC's New Rail Starts Program, including Bay Area Rapid Transit extensions to Colma, the San Francisco International Airport, West Pittsburg, and Warm Springs; a CalTrain Subway Extension to downtown San Francisco; and the Tasman Corridor Light Rail Transit in Santa Clara County. Phase 1 of the CAP includes expansion projects for which funding is currently available (e.g., Colma). Phase 2 of the CAP includes the remaining projects listed above that require additional funding. This is a Mobility Improvement Measure.

The intent of TCM 5, "Improve Access to Rail Systems," is to increase access to rail stations using some combination of the following measures: increased parking, increased feeder bus service, private shuttles to employment centers, and improved bicycle access. MTC would fund and review comprehensive rail access plans prepared by transit operators. Such analyses would recommend the most cost-effective access methods, including the possibility of parking charges. This Mobility Improvement Measure would occur primarily in Phase 2.

TCM 6, "Inter-city Rail," pertains to improving intercity rail service (i.e., rail service in the Auburn, Sacramento, San Jose corridor). MTC would propose legislation to fund this AMTRAK service in the 1991-92 State legislative session. Initial service would be provided in Phase 1 (funded by the recent Proposition 116), while the planned full level of service (10 trips per day) would be provided in Phase 2 of this Mobility Improvement Measure.

TCM 7, "Improve Ferry Service," includes continuing the ferry service provided after the 1989 Loma Prieta earthquake along with expanding ferry service. Possible expansions of ferry service to San Francisco would be from Vallejo, Berkeley and Richmond, Harbor Bay Isle, and Port Sonoma. Another opportunity would be a ferry between the San Francisco and Oakland Airports.

MTC would provide a long-term ferry service plan, as required by SB 2169, with an emphasis on commuter service. Proposition 116 provides $10 million for Vallejo service. Phase 1 of the CAP includes continuing the Oakland/Alameda ferry service. Phase 2 of the CAP includes expanded services that require additional funding. This is a Mobility Improvement Measure.

TCM 8, "HOV Lanes," involves implementation and enhancement of the <u>2005 HOV Lane Master Plan</u>, completed in 1990. The <u>2005 HOV Lane Master Plan</u> envisions 480 lane miles of HOV

lanes, compared to approximately 100 lane miles existing today. Enhancements may include direct connections between HOV lanes on intersecting freeways, "slip ramps" to allow carpools and busses to enter and exit HOV lanes directly, and park-and-ride lots. Phase 1 of this Mobility Improvement Measure would include projects that could be funded with existing resources (about $500 million), and Phase 2 would include projects requiring new funding sources.

TCM 9, "Bicycle Access," plans for: 1) increased numbers of local and regional bike routes, bike lanes and/or bike paths; 2) promotion of adequate curb lane widths for bicycles; 3) allowing bicycles on freeways where alternative routes do not exist; and 4) adjustment of traffic signals and pavement markings. This measure also includes providing means for bicycles to cross all Bay Area bridges and expanding the carrying capabilities of busses, ferries, and trains to carry bicycles. MTC would require cities and counties to adopt comprehensive bicycle plans in order to receive State Transportation Development Act funding (see also TCM 16, Indirect Source Review). Phase 1 of this Mobility Improvement Measure includes bicycle facilities for which funding is currently available; Phase 2 components would require additional funding.

Since Proposition 13, a number of Bay Area School Districts have not been able to afford to provide school bus service. TCM 10, "Students' Transportation," aims to reinstate school bus service, fund youth discount transit tickets and encourage carpooling for high school students. MTC would seek funding for these actions. MTC would also allocate funds to school districts for purchase of clean fuel buses where emission benefits are high. TCM 10 is a Phase 2 Mobility Improvement Measure.

TCM 11, "Freeway Traffic Operations System (TOS)," entails implementation and expansion of the existing Caltrans Traffic Operations System. The TOS includes traffic surveillance, ramp metering, traffic advisory signs, and incident management. Incident management means removing stalled cars, vehicles in accidents, and truck spills more quickly in order to reduce traffic jams. Under this measure, MTC would develop a Metropolitan Transportation System Operations Plan, in cooperation with Caltrans, which would better define the ramp-metering component of Caltrans TOS. In addition, MTC would seek funding for electronic toll collection on the Bay Bridge. In Phase 1 of the CAP, this TCM is identified as a Mobility Improvement Measure, which includes implementation of TOS on the Bay Bridge and its approaches. In Phase 2 of the CAP, this TCM

is identified as a Traffic Operation Management Measure, which includes expansion of TOS to 216-mile coverage, requiring additional funding.

The goal of TCM 12, "Arterial Traffic Management," is to reduce delays on arterial streets by instituting new signal timing programs, by improving traffic operation for buses, and by implementing "SMART streets." Arterial streets are major traffic corridors. They carry the most traffic of all non-freeway roadways. "SMART streets" refers to computerized coordination of traffic signals and the freeway TOS, so that arterial streets could relieve the congestion from a jammed freeway. Under this measure, MTC would conduct studies on improving arterial flows. In addition, Congestion Management Programs required under AB 1791 should include arterial traffic management studies. Maintaining the effectiveness of existing signal timing programs is a Phase 1 measure. Expansion of signal timing programs would occur in Phase 2 of this Traffic Operation Management Control Measure.

TCM 13, "Transit Fare Reduction," includes several possibilities for reducing transit fares: free feeder bus transfers between local bus systems and BART, CalTrain, and ferries; significantly reduced or eliminated off-peak fares; and special transit fares targeted at groups, families, tourists, or downtown visitors. The purposes of reducing fares are to increase ridership and to redress economic impacts on low-income persons who may be adversely affected by other measures in the Plan. TCM 13 also includes expansion transit ticket distribution procedures. Fare coordination and regional transit ticket distribution are included in Phase 1. Other proposals require funding and are included in Phase 2 under User Incentives.

Under TCM 14, MTC and RIDES for Bay Area Commuters, a regional ride-matching organization, would evaluate a publicly financed vanpool liability insurance program. The purpose of such a program would be to lower insurance costs to vanpools and hence make it easier to create more vanpools. The feasibility of this measure would be evaluated in Phase 1, and implementation would take place in Phase 2. This is a Phase 2, User Incentives TCM.

TCM 15, "Carpool Subsidies/Incentives," seeks ways to encourage carpools and vanpools (hereafter referred to as carpools). Financial incentives might include gasoline vouchers or other payments for carpools of three or more persons. Another incentive might be free tolls for vehicles with three or more persons 24 hours per day on all Bay Area toll bridges. Under this User Incentives

measure, the District and MTC would work for legislation that would change tax laws and otherwise encourage carpools. This would be a Phase 2, User Incentives TCM.

"Indirect sources" are land uses, such as commercial and residential projects, that produce or attract vehicle trips. For example, a shopping center itself does not emit significant amounts of pollutants, but patron automobiles driving to the shopping center do. This definition contrasts with "direct sources," such as industrial facilities, which may be major emitters of air pollutants in themselves, in addition to attracting worker vehicle trips. Other examples of indirect sources are convention and sports facilities, universities, hospitals, and airports. New highways and road improvements may also be classified as indirect sources.[5]

TCM 16, "Indirect Source Review," proposes to review indirect sources to achieve emissions reduction and traffic mitigation. This program would likely:

- encourage developments that minimize automobile dependence;
- require mitigation of significant air quality impacts;
- impose impact fees that would support alternatives to solo driving; and
- focus on indirect sources not covered by other trip-reduction measures.

Specific measures that could be applied to indirect sources include:

- increased densities near transit stations;
- maximum parking space limits;
- parking pricing;
- well-designed sidewalks and pedestrian paths;
- well-designed bike routes and parking;
- site design to ensure convenient transit circulation;
- site design to ensure convenient transit stops and waiting areas for transit vehicles and carpools; and
- controls on "drive through" operations.

The BAAQMD would implement and/or delegate to cities and counties an indirect source control regulation in two stages. The first stage would apply to new development, and the second stage would apply to existing development. In addition, the BAAQMD would develop criteria for delegating implementation of the indirect source to cities and counties that wish to assume the responsibility. Such delegation may depend upon BAAQMD approval of new air quality elements in local general plans. In cases where delegation does not occur, the BAAQMD would develop a new permitting system.

The goal of TCM 17, "Public Education," would be to change personal behavior in ways that would help achieve emissions reductions. MTC and the BAAQMD would jointly define and implement the public education program. Subjects would include health effects of air pollution, aspects of auto use that affect emissions, and information about transit. This Implementation Support Measure would occur in all phases.

TCM 18, "High Density Zones at Transit Stations," aims to encourage higher densities of development near transit stations. This goal can be achieved by altering land use plans for higher densities, clustering developments with mixed uses (including child care facilities), and providing transit-oriented design along mass transit lines. Transit-oriented design means promotion of pedestrian access, particularly from high-density residential development near transit stations.

Under TCM 18, MTC would assess the impact of a transit-oriented development pattern in the Bay Area. The District and MTC would encourage local governments to prepare site-specific plans in cooperation with transit operators. Finally, rail agencies would be encouraged to explore joint development opportunities (i.e., transit stations with commercial and residential developments). This is a Phase 1, Implementation Support Measure.

TCM 19, "General Plan - Air Quality Element," calls for the Air District to work with all Bay Area cities and counties to include Air Quality Elements in their General Plans. The Air Quality Element would identify air quality problems facing the community, as related to the Clean Air Plan. It would include transportation and traffic planning measures to encourage mass transit, higher densities near transit, a better jobs/housing balance and proximity, and maximum parking limits. There would be a requirement for consistency between the Air Quality Element and related

elements, including Circulation/Transportation, Land Use, Housing, Growth Management, and others, as appropriate. This is a Phase 1, Implementation Support Measure.

TCM 20, "Demonstration Programs," entails proposals to demonstrate the viability of three types of measures: telecommuting, electric or natural gas carpools and congestion pricing. Congestion pricing involves charging a driver for driving during peak periods in the peak traffic direction. One key issue in congestion pricing is how to track and charge the drivers. The demonstration program would address new technologies for tracking, including electronic monitoring of vehicles equipped with transponders or other devices that can be read as a car passes at high speed. During Phases 1 and 2 of this Implementation Support Measure, MTC and the BAAQMD would cooperate in the development and funding of these demonstration projects.

TCM 21, "Revenue Measures," encompasses the program through which many of the mobility measures would be funded. MTC and the BAAQMD would seek legislation to implement new or increased fees in a number of areas. The measures analyzed include the following:

- increasing tolls to $2 on all seven State-owned bridges in the Bay Area;
- increasing vehicle registration fees by $4 per year; and
- increasing the gasoline tax (or an equivalent mechanism) equal to 14 cents per gallon, and simultaneously overcoming current limitations on possible uses of the gas tax.

This Implementation Support Revenue Measure would be pursued during both Phases 1 and 2.

The Market-Based Transportation Control Measures would require authorization by the State legislature and, possibly, voter approval. Consequently, the specific details of these measures cannot be known at this time. The descriptions below indicate the basic concepts and the pricing levels that were analyzed.

The "Smog Fee" would consist of an increased vehicle registration fee based on emission level and mileage since last inspection. For example, a fee in cents per mile would be charged for each mile driven during the year. The cents per mile rate would vary by the pollutant concentrations in the tailpipe emissions during an annual vehicle inspection: the dirtier the vehicle, the higher the rate. Note that this measure would include an increase in the frequency of the existing Inspection and

Maintenance (I&M) Program inspections from every other year to every year. As analyzed, fees would range from $20 per year to over $1,000 per year depending on the specific vehicle and its pattern of use.

The "Gas Tax Increase" would entail significant increases in the gas tax to make driving more expensive and less attractive and to provide revenues for other TCMs (cf. TCM 21). A gas tax increase to $2.00/gallon was analyzed.

"Congestion Pricing" refers to peak volume pricing, much like the current system of billing telephone customers more for calls during weekday business hours. For traffic, congestion pricing would mean charging a driver for driving during peak periods in the peak traffic direction. In order to track the drivers, vehicles may be equipped with special cards, stickers, or electronic transponders. An electronic reader would note the identity of the vehicle as it passed at high speed (as opposed to stopping to register, which would be as slow as paying a toll). The driver would be sent a bill at the end of the month reflecting his or her use of peak traffic corridors at peak times. The revenue could be used to fund other TCMs. The analysis assumed pricing levels to maintain level of service (LOS) D on the regional freeway and arterial system.

The "Parking Management" measures include proposals to charge for parking at commercial establishments and employment sites. Employers with more than 50 employees would be required to charge their employees for parking; free work parking would be eliminated. Non-work parking charges would involve mandatory parking fees for commercial establishments and streets in commercial areas throughout the Bay Area. The analysis assumed non-work parking charges at $.60/hour and work parking charges of $3.00/day.

Turning back to other mobile source control measures, the District developed several measures separately from the MTC task force process. These are described below.

The Ozone Excess "No Drive Days" control measures involve reducing on-road motor vehicle usage by the general public and employers on days when ozone concentrations are predicted to exceed the State standards. Compliance with these control measures are either voluntary, as under Measure G3, or mandatory, as under Contingency Measure G4. Predictions of ambient air quality are made each day by the BAAQMD for the following day. On days when ozone concentrations are predicted to exceed the State standards, an advisory disseminated through the media would

direct the public to find alternative means of travel to single-occupancy vehicles (SOVs). These control measures are also being considered to avoid exceedances of CO standards in the winter.

Measure G3 is a near-term control measure that is to be completely voluntary and directed at the general public. Contingency Measure G4, a mandatory, employer-based intermittent control measure, is considered a contingency measure that could be implemented if the voluntary measure is ineffective. The District has historically had a program under which industries file Emergency Episode Plans, to be implemented if "alert" levels of pollution occur. These plans include measures to reduce emissions from industrial processes and from employee vehicle trips. Although these serious "alert" levels have not occurred for more than a decade, such plans still exist. Contingency Measure G4 would essentially lower the threshold for implementation of measures by employers to reduce auto use.

The Motor Vehicle Control Measures focus on reducing motor vehicle emissions by improving fuel efficiency (H1), substituting newer vehicles for older vehicles (Contingency Measure H2), replacing conventionally fueled fleet vehicles with "cleaner fueled" vehicles (H3), and converting diesel-powered transit buses to electricity (Contingency Measure H4).

The Smoking Vehicle Program (H1) would establish a public complaint program whereby citizens could register complaints with the BAAQMD regarding vehicles with excessive visible emissions. The owners of the smoking vehicles would be notified and requested to have their vehicles repaired. This measure may result in improved fuel economy for those cars complying with this request. Additional benefits of this measure include reducing the exposure of individuals to noxious fumes emanating from smoking vehicles.

The High Polluting Vehicle Retirement Program (Contingency Measure H2) would establish a buy-back program directed at replacing a specified number of pre-1975 vehicles (registered in the District and operable) with post-1982 vehicles. Older model vehicles create a disproportionate amount of pollution; this measure would encourage the replacement of older vehicles with newer vehicles, which have much lower emissions. In addition to the reductions of ROG and NO_x, this measure would reduce public exposure to noxious fumes from older vehicles. This measure is being proposed as a contingency measure.

The Requirement for Clean Vehicles in Fleets (H3) would require that certain fleet operators replace conventional gasoline-fueled vehicles with vehicles with lower emissions of ROG and NO_x. Replacement vehicles could be clean-burning gasoline-fueled vehicles or vehicles fueled with "clean fuels." Among the "clean fuels" being considered are methanol, compressed natural gas (CNG) and liquid petroleum gas (LPG - propane or butane). Electric vehicles, expected to produce the greatest emission reductions, are also being considered for clean fuel vehicle fleets. Clean fuel vehicles would result in a reduction in emissions of ROG and NO_x.

The Urban Bus System Electrification contingency measure (H4) would require that urban transit buses operating along major fixed routes be converted to electric buses operating on overhead trolley wires. Conversion of diesel-fueled buses to electric buses would result in the greatest emission reductions for NO_x and particulate matter with lower emission reductions for ROG and CO. This measure is being proposed as a contingency measure.

STATIONARY SOURCE CONTROL MEASURES

Measures to reduce emissions of ozone precursors and carbon monoxide from stationary sources are directed at industrial, commercial and residential facilities. Industrial facilities emit NO_x and CO from the combustion of fossil fuels to process materials. Emissions of reactive organic gases (ROGs) result from the application of coatings, use of solvents, and processing of hydrocarbons at refineries and chemical plants. Residences emit NO_x and CO in the combustion of natural gas to provide heat to cook food and to heat water and air. Combustion of fossil fuels at utilities also produces NO_x and CO in the generation of electricity to operate household appliances and lights. Residences are also a source of ozone precursors emitted from solvents, paints, pesticides, and other household products. Commercial establishments, such as retail outlets, restaurants and office buildings, emit ozone precursors and CO from activities similar to those discussed for residences: heating, cooking, and the use of architectural coatings and consumer products.

The stationary source control measures included in the CAP, and discussed below, have been divided into seven categories:

- A Surface Coating and Solvent Use Control Measures
- B Fuels/Organic Liquids Storage and Distribution Control Measures

C Refinery and Chemical Processes Control Measures

D Combustion of Fuels (NO_x Sources) Control Measures

E Other Industrial/Commercial Processes Control Measures

F Other Stationary Source Control Measures

G Intermittent Control Measures

A list of the control measures proposed under each of these categories and the BAAQMD regulations that would be adopted or modified if the CAP were adopted are shown in Table 3-5. For further discussion of the regulatory history of each of these control measures, refer to the BAAQMD document 1991 Clean Air Plan, Candidate Control Measure Descriptions, Draft, March 18, 1991. Emission reductions for each class of control measures may be found in Section 4.1, Air Quality.

Surface Coating and Solvent Use Control Measures

The Surface Coating and Solvent Use Control Measures include 19 measures to reduce emissions of ROGs. Emission reductions from these measures would be accomplished by lowering volatile organic compound (VOC) limits in coatings (A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A13, A19), improving coating transfer efficiencies (A3, A5, A6, A11), requiring abatement devices (A7, A8, A9), establishing facilitywide emission limits for specified coating operations (A10), limiting emissions from cleaning solvents (A11), eliminating "emission credits" (A12), regulating special processes within an industry (A13, A14, A15, A16), and controlling household solvents (A17) and commercial solvents (A18).

The Improved Architectural Coatings Rule (A1) would lower the allowable VOC limits on certain specialty coatings, (e.g., clear wood finishes) below current regulated levels and remove the existing exemptions for coatings sold in small containers. Both manufacturers and end-users are prohibited from producing or using regulated coatings that do not meet VOC limits. Meeting new regulatory requirements for lower VOC limits would be accomplished through reformulation or the development of alternate technologies, such as reactive diluent technology. Reactive diluent coatings have organic solvents that chemically react to become part of the finished coating and, therefore, are not emitted into the atmosphere.

TABLE 3-5
PROPOSED CONTROL MEASURES
AND
RELATED BAAQMD REGULATIONS

Control Measure		Regulation
Surface Coating and Solvent Use Control Measures		
A1	Improved Architectural Coatings Rule	Regulation 8, Rule 3
A2	Improved Industrial Maintenance Coatings Rule	Regulation 8, Rule 48
A3	Improved Aerospace Coatings Rule	Regulation 8, Rule 29
A4	Improved Wood Furniture and Cabinet Coatings Rule (Adopted April 17, 1991)	Regulation 8, Rule 32
A5	Improved Surface Coating of Miscellaneous Metal Parts and Products Rule	Regulation 8, Rule 19
A6	Improved Surface Coating of Plastic Parts and Products Rule	Regulation 8, Rule 31
A7	Improved Can and Coil Coating Rule	Regulation 8, Rule 11
A8	Improved Magnet Wire Coating Operations Rule	Regulation 8, Rule 26
A9	Improved Automobile Assembly Coating Operations Rule	Regulation 8, Rule 13
A10	Improved General Solvent and Surface Coating Rule	Regulation 8, Rule 4
A11	Further Control of Emissions from Adhesives Use	
A12	Elimination of Coatings Rules Alternative Emission Control Plans	Regulation 8, Rules 11, 20, 32, and 43
A13	Improved Graphic Arts Printing Operations Rule	Regulation 8, Rule 20
A14	Improved Coatings and Ink Manufacturing Rule	Regulation 8, Rule 35
A15	Improved Resin Manufacturing Rule	Regulation 8, Rule 36
A16	Improved Semiconductor Manufacturing Operations Rule	Regulation 8, Rule 30
A17	Control of Emissions from Household Solvent Disposal	Currently not regulated
A18	Substitute Solvents Used for Surface Preparation/Cleanup of Surface Coatings	Regulation 8, Rule 1 and 16
A19	Ultra-Low VOC Coatings	Regulation 8, All Rules
Fuels/Organic Liquids Storage and Distribution Control Measures		
B1	Control of Emissions from Railcar Loading	Currently not regulated
B2	Improved Storage of Organic Liquids Rule	Regulation 8, Rule 5
B3	Improved Organic Chemical Terminals and Bulk Plants Rule	Regulation 8, Rule 6
B4	Further Emissions Reductions from Gasoline Delivery Vehicles	Source Test Procedure ST-33
B5	Limitations on Marine Vessel Tank Purging	Currently not regulated
B6	Control of Emissions from Cleaning-Up Organic Liquids	Regulation 8, Rule 2 and 9
B7	Control of Emissions from Propane Handling	Currently not regulated

TABLE 3-5 continued

Refinery and Chemical Processes Control Measures		
C1	Improved Pressure Relief Valves at Refineries and Chemical Plants Rule	Regulation 8, Rule 28
C2	Improved Pump and Compressor Seals at Refineries and Chemical Plants Rule	Regulation 8, Rule 25
C3	Improved Valves and Flanges at Refineries and Chemical Plants Rules	Regulation 8, Rule 18 and 22
C4	Improved Process Vessel Depressurization Rule	Regulation 8, Rule 10
C5	Improved Wastewater (Oil-Water) Separators Rule	Regulation 8, Rule 8
C6	Further Control of Emissions from Wastewater Treatment at Refineries	Regulation 8, Rule 8 Regulation 11, Rule 12
C7	Control of Emissions from Petroleum Refinery Flares	Currently not regulated
Combustion of Fuels (NO_x Sources) Control Measures Including		
D1	Control of Emissions from Non-Utility Reciprocating Engines	Currently not regulated
D2	Control of Emissions from Stationary Gas Turbines	Currently not regulated
D3	Control of Emissions from Electric Power Generating Boilers	Regulation 9, Rule 3
D4	Control of Emissions from Boilers, Steam Generators and Process Heaters	Regulation 9, Rule 3
D5	Control of Emissions from Cement Plant Kilns	Currently not regulated
D6	Control of Emissions from Glass Manufacturing Plant Melting Furnaces	Currently not regulated
D7	Control of Emissions from Residential Water Heating	Currently not regulated
Other Industrial/Commercial Processes Control Measures		
E1	Control of Emissions from Rubber Products Manufacturing	Regulation 8, Rule 2 and 4
E3	Control of Emissions from Commercial Charbroiling	Currently not regulated
Other Stationary Source Control Measures		
F1	Improved New Source Review Rule	Regulation 2, Rule 2
F2*	Emission Minimization Management Plan	Currently not regulated
F3	Promotion of Energy Efficiency	Currently not regulated
F4	Enhanced Enforcement of Existing District Regulations	Regulation 8, Enforcement Strategy

*Contingency Measure.

TABLE 3-5 continued

Intermittent Control Measures		
G1	Citizen Postponement of Discretionary Activities	Regulation 4
G2	Industrial Postponement of Activities During Forecast Ozone Excess Days	Regulations 8, Rule 44 and Regulations 4 and 5

Source: Candidate Control Measure Descriptions, BAAQMD, Draft, March 18, 1991.

The Improved Industrial Maintenance Coatings Rule (A2) is similar to Control Measure A1; however, this measure targets emissions of ROGs from industrial maintenance coatings used on architectural structures.

The Improved Aerospace Coatings Rule (A3) would establish minimum transfer efficiency requirements for aerospace coating, affecting coating operations of aircraft, helicopters, missiles, and related components. Transfer efficiency is defined as the ratio of the coating that adheres to the product to the total coating applied. Transfer efficiencies for conventional air atomization are approximately 30 to 60 percent, while combining conventional atomization with electrostatic technology can achieve a 65 to 85 percent transfer efficiency. This control measure would also set more stringent VOC limits for aerospace specialty coatings, where feasible.

The Improved Wood Furniture and Cabinet Coatings Rule (A4) would establish VOC limits for coatings used in this industry and remove existing exemptions for small users. Coatings in the wood furniture industry that contain VOCs include fillers, sealers, primers, stains, lacquers, topcoats and washcoats.

Similar to control measures A3 and A6, the Improved Surface Coating of Miscellaneous Metal Parts and Products Rule (A5) would require a minimum transfer efficiency for application of metal parts coatings. Metal parts, such as farm and industrial machinery, small appliances and fabricated metal components, are coated to prevent corrosion and to improve appearance. Among the coating technologies that could be used to meet the more stringent transfer efficiency limits are airless, air-assisted airless, electrostatic and high-volume/low-pressure (HVLP) spraying. This control measure would also set more stringent VOC limits for metal parts specialty coatings, where feasible.

The Improved Surface Coating of Plastic Parts and Products Rule (A6) would establish minimum transfer efficiency requirements for plastic parts coatings. Plastic parts and products include signs, computer and machinery housings, small appliances and fixtures. The same technologies used to improve transfer efficiencies (as discussed for Control Measure A5) would apply to this industry. This control measure would also lower VOC limits for plastic parts specialty coatings, where feasible.

The Improved Can and Coil Coating Rule (A7) would lower VOC limits for certain surface coatings applied to metal coils and containers where feasible. Lower VOC limits would be met by industry through coating reformulation or development of new coating technologies. Among the emerging coating technologies that could be employed to meet the new standards are radiation-curable coatings and powder systems. Facilities meeting the VOC limits through equivalent control with abatement devices may need to increase the efficiency of abatement devices and collection systems.

The Improved Magnet Wire Coating Operations Rule (A8) would reduce ROG emissions from the use of magnet wire coatings by eliminating exemptions from VOC limits currently in effect. Reformulation of magnet wire coatings with water-borne or high solids coatings are possible control strategies that could be used to meet the VOC limits. Abatement devices, such as incinerators and carbon adsorption systems, are another possible control strategy that could be employed, although these add-on controls are not as cost-effective as low VOC coatings.

The Improved Automobile Assembly Coating Operations Rule (A9) would reduce ROG emissions at the only automobile assembly plant currently operating in the Bay Area. Ozone precursors at this facility would be reduced by regulating emissions from coating areas that are essentially uncontrolled. Emission reductions in these areas would be accomplished through the reformulation of automotive coatings. If low VOC coatings do not become available in a reasonable time frame, the installation of add-on exhaust controls may be required.

The Improved General Solvent and Surface Coating Rule (A10) would reduce ROG emissions by establishing VOC limits and/or facilitywide emission limits for general coating operations. The standards for general-use coatings currently do not limit VOC content.

The Further Control of Emissions from Adhesives Use (A11) control measure would reduce ROG emissions by establishing VOC limits, requiring high transfer efficiencies and limiting emissions from cleanup solvents through the use of closed systems. This regulation would substitute conventional organic solvent-borne adhesives, which emit relatively high levels of ROGs, with adhesives that have lower VOCs, such as water-base, hot-melt, high solids and polymerizing adhesives, which have fewer or no VOCs. Improved transfer efficiencies could be achieved through electrostatic or HVLP sprayers, roll coaters and hand applicators.

The Elimination of Coatings Rules Alternative Emission Control Plans (A12) measure would reduce ROG emissions by removing the Alternative Emission Control Plan (AECP) provisions from applicable District surface coating rules. AECPs allow the transfer of "emission credits" between different sources. Emission credits are given to facilities that reduce emissions below the standards. These emission credits may then be used to offset emissions that exceed the standards at other sources. Eliminating AECPs would reduce emissions by requiring each source to meet the applicable standards and by facilitating the enforcement of regulations.

The Improved Graphic Arts Printing Operations Rule (A13) would reduce ROG emissions from graphic arts printing. The limits on the content of organic solvent contained in fountain solutions used in offset lithographic printing would be lowered. The measure would also require that automatic "blanket washers" be used for cleaning the cylinders of large printing presses. Another part of this measure involves reducing the VOC limits for inks. Finally, fugitive VOC emissions will be reduced by requiring the enclosure of "doctor blades," used to define the ink layer on certain printing cylinders.

The Improved Coatings and Ink Manufacturing Rule (A14) would reduce ROG emissions from coating and ink manufacturing facilities by establishing more stringent requirements for vat mixing and cleaning operations, eliminating existing exemptions, and extending these regulations to include adhesives manufacturing. ROG emissions occur during cooking, mixing and solvent cleaning operations at facilities manufacturing coatings and ink. One emission control option involves collecting fugitive emissions from mixers and mills, and venting them to abatement devices such as carbon adsorption systems or an incinerator. Emission reductions from vat cleaning would require the use of low-VOC cleanup solvents or enclosed cabinet washing systems.

The Improved Resin Manufacturing Rule (A15) would reduce ROG emissions from resin manufacturing operations by regulating fugitive emissions during the pellet extrusion and final product packaging phases of manufacturing. This measure would extend existing regulations for resin manufacturing, Regulation 8, Rule 36, which requires control of emissions from resin reactors, thinning tanks and blending tanks to these two additional sources of emissions.

The Improved Semiconductor Manufacturing Operations Rule (A16) would reduce ROG emissions from semiconductor manufacturing operations by regulating emissions from positive photoresist operations and cleaning operations that use coating-type application equipment. The semiconductor industry uses organic solvents in the photoresist process to add circuitry to computer chips. Large volumes of organic solvents are also used to remove particles and contamination from computer circuitry. The BAAQMD currently regulates only negative photoresist operations, which have much more substantial emissions than positive photoresist.

The Control of Emissions from Household Solvent Disposal (A17) would reduce ROG emissions from household waste by providing instructions on household solvents describing the proper procedures for storing, sealing, transporting and disposing of these products. Secondly, this measure would encourage municipalities to facilitate the disposal of household solvents through more frequent, convenient and publicized waste disposal drives. Common household products that contain VOCs include furniture polish, pesticides, paints, stains and lacquers.

The control measure to Substitute Solvents Used for Surface Preparation/Cleanup of Surface Coatings (A18) would reduce ROGs by requiring the use of low-VOC and/or low vapor pressure solvents for cleanup and surface preparation in surface coating operations. In addition, handling procedures to reduce emissions would also be specified under this control measure.

The Ultra-Low VOC Coatings (A19) control measure is a long-range measure that would reduce ROG emissions from surface coating operations by substituting photochemically reactive volatile organic solvents with oil produced from the plant *Vernonia Galamensis* or with radiation curable coatings. These alternative coating technologies have the potential to reduce the VOC content of surface coatings to nearly zero. Coatings prepared with Vernonia oil could be used to comply with many rules governing emissions of ROGs under Regulation 8. For some coating applications, radiation-curable coatings may be a more appropriate ultra-low VOC technology.

Fuels/Organic Liquids Storage and Distribution Control Measures

The emission reductions from the Fuels/Organic Liquids Storage and Distribution Control Measures focus on reducing ROG emissions by controlling emissions caused by the transfer of organic liquids,

in which organic vapors are displaced into the atmosphere, and by establishing design criteria for organic liquid storage facilities.

The Control of Emissions from Railcar Loading (B1) measure would reduce ROG emissions occurring when railcars are being loaded with organic liquids. Typical control technologies for this measure would be vapor balance, carbon adsorption, thermal oxidation, and refrigeration. The BAAQMD currently regulates emissions from off-loading of railcars into stationary sources.

The Improved Storage of Organic Liquids Rule (B2) would reduce ROG emissions from organic liquid storage tanks by further regulating emissions for specific types of fixed and floating roof tanks. These tanks are typically found at petroleum refineries, chemical plants and bulk distribution facilities. Emissions from storage of organic liquids occur from breathing and working losses. Breathing losses result from changes in temperature and barometric pressure causing vapor contraction and expansion. Working losses occur from the displacement of vapors during filling and emptying of the storage tanks.

The Improved Organic Chemical Terminals and Bulk Plants Rule (B3) would reduce emissions of ROG from non-gasoline bulk plant operations by modifying exemption criteria and lowering existing emission limitations. The non-gasoline terminals and bulk plant facilities proposed for regulation under this control measure would be facilities where liquid organic chemicals are received, stored in stationary tanks, and loaded into tank trucks or other cargo carriers for delivery to other plants or distribution points. Currently, chemicals with vapor pressures in excess of 1.5 pounds per square inch (psi) are regulated under Regulation 8, Rule 6; this control measure would reduce the vapor pressure of chemicals required to comply with this regulation to 0.5 psi.

The Further Emissions Reductions from Gasoline Delivery Vehicles (B4) control measure would reduce ROGs by establishing more stringent standards for gasoline delivery vehicle vapor recovery components. This control measure would both set more stringent standards and develop a test for compliance with this standard. Under existing laws, the ARB would have to implement this measure. In addition to reducing emissions of ROG during tank loadings at gasoline bulk terminals, this measure would also reduce emissions in transit.

The Limitations on Marine Vessel Tank Purging (B5) control measure would reduce ROG from marine vessel housekeeping and ballasting operations which result in the release of ROG from cargo holds. Potential control measures to reduce these emissions include on-board or on-shore vapor control devices (e.g., refrigeration, absorption, adsorption, or incineration), or by restricting the purging of gas in the cargo holds until the ships are outside a specified area thereby not affecting the Bay Area's air quality. The BAAQMD currently regulates emissions from marine tank vessels during filling at marine terminals and during lightering operations; this measure would add emissions from housekeeping and ballasting operations.

The Control of Emissions from Cleaning-Up Organic Liquids (B6) control measure would reduce ROG emissions through regulating emissions from vacuum trucks that clean up hydrocarbon spills, and from equipment used to clean out gasoline storage tanks, tank trucks and railcars containing residual organic liquids. This control measure proposes the use of a carbon adsorption canister to remove displaced ROGs from the vapor space of the storage tank on the vacuum truck before the escaping volume of air is released to the atmosphere.

The Control of Emissions from Propane Handling Measure (B7) would reduce ROG emissions by regulating gas venting during LPG fuel transfers and servicing of larger LPG tanks. LPG either displaced during the filling of tanks or vented from tanks prior to servicing would be pumped back into the storage tanks, incinerated, or captured with a carbon adsorption system. Currently there are no BAAQMD, State or federal regulations governing emissions from this source.

Refinery and Chemical Processes Control Measures

The Refinery and Chemical Processes Control Measures would reduce emissions of ROG occurring at chemical plants and refineries by regulating fugitive emissions from leaking valves, flanges, pumps and compressors, from flaring, and from refinery wastewater systems.

The Improved Pressure Relief Valves at Refineries and Chemical Plants Rule (C1) would reduce emissions of ROG by requiring chemical plants and refineries to install rupture disks with tell-tale indicators, or provide venting to an abatement device for pressure relief valves. Pressure relief valves are used at these facilities to relieve pressure in systems handling organic liquids when the internal pressure in the system rises above a safety limit.

The Improved Pump and Compressor Seals at Refineries and Chemical Plants Rule (C2) would reduce fugitive emissions of ROG by requiring improved seals for pumps and compressors which are used to move organic liquids and gasses at refineries, chemical plants and bulk distribution facilities. Improved technology in the seals of pumps and compressors can now reduce emissions from these sources to very low levels.

The Improved Valves and Flanges at Refineries and Chemical Plants Rules (C3) would reduce fugitive emissions of ROG by requiring improved packing materials and gaskets, and establishing more stringent inspection and maintenance programs for valves and flanges at chemical plants and refineries. Fugitive emissions at these facilities are the result of organic compounds leaking from valve-stem packing materials and gaskets at flanges joining pipes.

The Improved Process Vessel Depressurization Rule (C4) would reduce ROG emissions by improving depressurization standards and establishing flare gas recovery system sizing requirements for process vessel depressurization at petroleum refineries and chemical plants. During shutdowns or turnarounds of process vessels, where materials are processed or synthesized, depressurization, the removal of materials from the vessel, occurs via fuel gas or vapor recovery, followed by venting to a flare system. This control measure would target residual emissions from the depressurized vessels and emissions resulting from inadequately sized flares. Controls to meet more stringent depressurization standards include carbon adsorption systems, refrigeration, incineration and certain scrubbing systems.

The Improved Wastewater (Oil-Water) Separators Rule (C5) would reduce emissions of ROG from non-municipal wastewater treatment facilities by requiring abatement devices on specified units and covers on small units (currently units processing under 200 gallon per day are exempt). This control measure addresses the primary wastewater treatment typically occurring at refineries; emissions occurring at secondary wastewater treatment processes are addressed in C6. The sources of emissions at the primary treatment processes are the oil-water separators, dissolved air floatation (DAF) units, drains, and junction boxes. Solid covers, a well established control technology in the petrochemical industry, would contain fugitive emissions of VOCs and dissolved organic gases from wastewater contained in open drains and wastewater separators. Additionally, vents from certain

covered units would be controlled by feeding the vapors to a combustion device, such as an incinerator or carbon adsorber.

The Further Control of Emissions from Wastewater Treatment at Refineries (C6) measure would regulate emissions of ROG from secondary wastewater treatment processes at refineries. These emissions occur downstream of the DAF units, which are proposed for regulation under C5. This control measure proposes covers on wastewater processing equipment and replacing hydrocarbon panels with covered tanks vented to abatement devices. This measure would also regulate emissions during pond desludging.

The Control of Emissions from Petroleum Refinery Flares (C7) measure would reduce emissions of ROG and NO_x by eliminating routine flaring and allowing flaring only for emergency purposes. This control measure would depend on flare gas recovery systems to divert organic compounds currently being flared. This measure would also rely on improved operating conditions at refineries to reduce emergency situations where build-up of gases must be disposed of through flaring. In the event of an emergency in which flares would be required, this measure would regulate combustion efficiencies of waste gases and require improved flare monitoring.

Combustion of Fuels (NO_x Sources) Control Measures

The emission reductions from the Combustion of Fuels (NO_x Sources) Control Measures focus on reducing emissions of NO_x at a variety of combustion sources either through modification of the combustion processes or through the treatment of post-combustion flue gases.

The Control of Emissions from Non-Utility Reciprocating Engines (D1) measure would reduce emissions of NO_x by regulating stationary reciprocating internal combustion (IC) engines with 50 horsepower (HP) output or greater. Control measures for IC engines include operational modifications, engine combustion modifications, and post-combustion flue gas treatment (add-on controls). This measure would most likely require add-on controls, such as nonselective catalytic reduction (NSCR) and selective catalytic reduction (SCR). The SCR and NSCR technologies reduce NO_x formed during combustion to nitrogen gas (N_2) and water vapor.

The Control of Emissions from Stationary Gas Turbines (D2) measure would reduce emissions of NO_x by regulating stationary gas turbines with an output of one-megawatt (MW) or greater. Control measures for gas turbines include methanol-fueling, steam or water injection and/or SCR.

The Control of Emissions from Electric Power Generating Boilers (D3) measure would reduce emissions of NO_x by regulating electric power generating boilers ("utility" boilers), which are large units typically having a fuel input rate of 250 MMBtu/hour or more. This measure would most likely require add-on controls, such as SCR or non-catalytic selective reduction (NCSR).

The Control of Emissions from Boilers, Steam Generators and Process Heaters (D4) measure would reduce NO_x emissions by regulating industrial and commercial boilers, steam generators and process heaters, having a fuel input rate of 5 MMBtu/hour or more. Regulations proposed under this control measure would most likely be met through combustion modifications such as low-NO_x burners and flue gas recirculation. Post-combustion flue gas treatment technologies such as NCSR, and SCR may be required in some instances.

The Control of Emissions from Cement Plant Kilns (D5) measure would reduce emissions of NO_x from portland cement manufacturing plants by regulating NO_x emissions from precalciner/kilns. The method of reducing NO_x emissions from this source most likely would be cyanuric acid injection, an NCSR post-combustion process, although this technology has not yet been used successfully on full-scale cement kilns.

The Control of Emissions from Glass Manufacturing Plant Melting Furnaces (D6) measure would reduce emissions of NO_x from container glass melting furnaces by combustion and process modifications. Among the methods used to obtain these NO_x reductions are: increasing the use of scrap glass; increasing electrical boosts to sustain molten state of glass; reducing the volume of air for fuel combustion; insulating the furnace; briquetting and preheating the feed mix; and, modifying burner design.

The Control of Emissions from Residential Water Heating (D7) measure would reduce NO_x emissions from new residential gas-fired water heaters sold in the Bay Area by establishing emission limits for these sources. It is expected that the proposed NO_x limits will be achieved by burner redesign, and perhaps other combustion modifications.

Other Industrial/Commercial Processes Control Measures

The emission reductions from the Other Industrial/Commercial Processes Control Measures focus on reducing emissions of ROG in the rubber industry and for commercial establishments using charbroilers in the preparation of food.

The Control of Emissions from Rubber Products Manufacturing (E1) measure would reduce emissions from rubber products manufacturing by regulating emissions from curing and molding processes and from cementing operations. Due to the large diversity in rubber product manufacturing, it is difficult to identify the probable method of emissions control. In general, emissions from rubber manufacturing processes would vent emissions to an abatement device such as an incinerator or carbon adsorption system.

The Control of Emissions from Commercial Charbroiling (E3) control measure would reduce ROG emissions from commercial charbroiling operations by requiring add-on exhaust controls, such as adsorbers and afterburners. Electrostatic precipitators (ESP) may be required to remove particulates prior to carbon adsorption; reduced particulate emissions would be an additional benefit of this control method. Emissions from this source could also be reduced by substituting grooved griddles which imitate the appearance and flavor of charbroilers.

Other Stationary Source Control Measures

The emission reductions from the Other Stationary Source Control Measures focus on reducing emissions of criteria pollutants by enforcing and making more stringent existing regulations. In addition, this category addresses potential emission reductions from improved energy efficiency.

The Improved New Source Review Rule (F1) will amend the BAAQMD's existing New Source Review Rule, Rule 2, Regulation 2, to comply with the "no net increase" requirements in the State Clean Air Act. This rule would require almost any new or modified sources of ROG, NO_x or CO to apply the Best Available Control Technology (BACT). Emission offsets would be required for any significant increase in emissions. An emission offset is a reduction in emissions which is used to mitigate increases in emissions.

The Emission Minimization Management Plan (Contingency Measure F2) is an interim measure which would restrict the emissions of major ozone precursor emitting facilities to their 1987 levels. This rule would prevent an increase in emissions due to growth in the affected industries until these emissions are reduced by command and control regulations. This measure is being proposed as a contingency measure.

The Promotion of Energy Efficiency (F3) measure would attempt to reduce emissions by encouraging more efficient combustion of fossil fuels to provide energy for the myriad of functions in all sectors of our society. The structuring of programs or rules that would come under this regulation have not yet been fully explored as well as many other legal and technical issues surrounding this measure.

The Enhanced Enforcement of Existing District Regulations (F4) would attempt to improve compliance with existing regulations. A number of potential control methods being considered include rule development, restructuring enforcement staff activities, enforcement audits, increased surveillance, increased penalties for non-compliance and increased public awareness of standards.

Intermittent Control Measures

The emission reductions from Intermittent Control Measures would reduce emissions of air pollutants by the public and industry by encouraging the postponement or curtailment of activities which generate these pollutants on days when the BAAQMD forecasts potential exceedances of an air quality standard.

The Citizen Postponement of Discretionary Activities (G1) control measure would reduce emissions by encouraging the public to either curtail or postpone pollution-generating activities on days when ozone (and possibly CO) concentrations are predicted to exceed the State standards. Compliance with these control measures would be voluntary. Predictions of ambient air quality are made each day by the BAAQMD for the following day. On days when ozone (or CO) concentrations are predicted to exceed the State standards, an advisory would be disseminated through the media that would direct the public to postpone or curtail activities resulting in the emissions.

Industrial Postponement of Activities During Forecast Ozone Excess Days (G2) would postpone non-production related activities resulting in the emission of ozone precursors on days when exceedances of the ozone standard are forecast. These activities could include maintenance coating, uncontrolled soil aeration, repairs of external floating roof seals, uncontrolled cleaning of storage tanks, marine vessel tanks and tank cars, process vessel depressurization, fuel oil storage and check out of stand-by engines.

The next chapter discusses relevant environmental background information and the anticipated environmental impacts of the CAP. Mitigation measures to reduce these impacts are also presented.

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1. Health and Safety Code, Sections 39001, 39601 and 39606 (a).

2. BAAQMD, Air Quality Handbook, p. 21. One square mile = 640 acres.

3. Acceptable concentration levels for some pollutants are chosen after careful review of available data on health effects. Pollutants subject to federal ambient standards are referred to as "criteria pollutants" because the EPA publishes criteria documents to justify the choice of standards.

4. State of California, California Health and Safety Code, Section 40922(b).

5. BAAQMD, Memorandum, STCM 16, January 16, 1991.

4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

INTRODUCTION

Under CEQA, a significant effect is defined as a substantial, or potentially substantial, adverse change in the environment (Public Resources Code 21068). The guidelines that implement CEQA direct that this determination be based on scientific and factual data. The specific standards of significance for determining the impact of a given control measure are identified in the discussions included in each issue section of this EIR.

This chapter describes: a) the environmental setting of the project; b) the impacts resulting from implementation of the project; and c) mitigation measures that would reduce impacts of the project.

The issue sections below consist of three parts: 1) Setting; 2) Impacts and Mitigation Measures; and 3) Cumulative Impacts and Mitigation Measures. The existing baseline conditions for each issue area and related regulations are addressed in the setting. The impact and mitigation measures section identifies the potential effects of the CAP, establishes the pre-mitigation level of significance, identifies available mitigation measures, and states the potential significance after implementation of the mitigation measures.

Analysis of specific control measures proposed in the CAP is constrained by the amount of information that is currently available. As a result, approval of the CAP may not eliminate the need to conduct appropriate tiered environmental analyses of the specific impacts of individual control measures in the future.

Proposed mitigation measures for impacts of the control measures proposed in the CAP vary in detail depending upon the level of planning that has been completed to date for such measures. In some cases, a greater amount of detail is known about a control measure that is well into the planning process. In these cases, mitigation measures are presented that address the greater specificity of the control measure. For other control measures, mitigation measures are necessarily more general.

Three types of environmental impact are identified in the Draft EIR: beneficial impacts, significantly adverse impacts, and less than significant impacts. The last type has been divided into two categories: less than significant impacts for which mitigation measures, although not required by CEQA, are identified to further reduce potential effects; and less than significant impacts for which further mitigation measures are not identified. All identified impacts are numbered and shown in bold type-face, and the corresponding mitigation measures are shown in italics. Each impact and mitigation measure is numbered consecutively for individual sections of the Draft EIR. Unless noted otherwise, all impacts are considered significant and adverse prior to mitigation.

4.1 AIR QUALITY

SETTING

Climate and Physiography of the Bay Area

The jurisdictional boundaries of the Bay Area Air Quality Management District (BAAQMD), known as the Bay Area air basin, encompass the Counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara and portions of western Solano and southern Sonoma, totalling approximately 5,600 square miles (see Figure 3-1).[1,2] The Bay Area physiography is characterized by a large shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors present in the Bay Area result in an increased potential for accumulation of air pollutants in the inland valleys and a reduced potential for buildup of air pollutants near the coast.

The climatology of the Bay Area, in combination with the topography and pollutant emissions, determines the atmospheric pollution potential. The atmospheric pollution potential is the potential for a given quantity of air emissions to be dispersed as a result of the combined influence of atmospheric and geographic conditions thereby either lowering or increasing the potential for exceedances of ambient air quality standards. In the Bay Area there is a wide range of atmospheric pollution potential resulting predominately from four factors: winds, atmospheric stability, solar radiation and sheltering terrain.

Winds can disperse air pollutants. Atmospheric pollution potential increases in the sheltered valleys of the Bay Area because the terrain tends to reduce wind speeds. This reduced wind speed in the valleys in combination with daytime up-valley and nighttime down-valley flow result in the accumulation of pollutants. Temporally, these low wind speeds usually occur in conjunction with periods of high pollution emissions, typically during the early morning and late afternoon or evening commute traffic, and on clear, cold winter nights when residential space heating emissions are highest.

Whereas winds are indicative of horizontal dispersion of air pollution, atmospheric stability determines the ability of air pollutants to be dispersed vertically. In the Bay Area the ability of air pollutants to be dispersed vertically is frequently limited by inversions. An inversion, described

as a blanket of warm air trapping a layer of cooler air beneath, forms an almost impenetrable barrier to air pollutants at the upper boundary between the two air masses. Inversions result from a variety of climatic factors and the different types of inversions have a wide seasonal variation.

Solar radiation plays an integral role in the formation of photochemical smog. In the presence of sunlight and warm temperatures, hydrocarbons and oxides of nitrogen combine to produce photochemical air pollutants, the largest fraction of which is ozone. The inland valleys of the Bay Area experience higher temperatures and more abundant sunshine than the coastal areas and, therefore, have a higher atmospheric pollution potential with respect to the formation of photochemical smog.

In summary, the sheltered inland valleys of the Bay Area, with their tendency for light winds, atmospheric stability, abundant sunshine and high summer and low winter temperatures, have a high air pollution potential. Coastal areas, experiencing less atmospheric stability, less sunshine, higher wind speeds and more moderate temperatures, have a lower air pollution potential.

Regulatory History

Criteria Pollutants

Air quality in the Bay Area is subject to both State and federal regulations. The proposed project, the 1991 Clean Air Plan (CAP), is proposed to meet the California Clean Air Act (CCAA) requirements. The CCAA requires that each regulatory authority governing emissions of air pollutants in different regions of the State adopt a strategy to achieve and maintain the State ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide by the earliest practicable date. In the Bay Area, the BAAQMD, MTC, and ABAG are the agencies responsible for preparing the proposed strategy to improve the air quality. Based on monitoring data collected and compiled by the BAAQMD, the Bay Area is not in attainment (i.e., exceeds the California Ambient Air Quality Standards, or, "nonattainment") for two of these pollutants, ozone (O_3) and carbon monoxide (CO).

Regulating air emissions in the Bay Area began in the 1950s and has steadily become more stringent with each passing year. The earliest regulatory measures were those adopted by the California Air Resources Board (CARB) to limit the emissions from motor vehicles statewide. In

1955, the California Legislature established the BAAQMD to develop and enforce regulations to control air pollution from stationary sources in the Bay Area. Under the federal Clean Air Act, the BAAQMD has prepared two air quality plans, in 1979 and 1982. The 1982 Bay Area Air Quality Plan (AQP) is the most recent plan addressing a regional strategy toward reducing emissions of air pollutants to meet federal air quality standards.

The California Clean Air Act (CCAA) of 1988 requires the preparation of a strategy to meet State ambient air quality standards. This strategy proposed for the Bay Area is embodied in the 1991 Clean Air Plan. The CCAA identifies air quality goals, planning mechanisms, regulatory strategies, and standards of progress. Under the CCAA, emissions reductions in the Bay Area would result not only from control measures adopted in the CAP, but also from control measures adopted by the California Air Resources Board.

For a more in-depth discussion of Bay Area, State and federal regulatory history refer to Chapter 3, Project Description, Section 3.2, Background.

Toxic Air Contaminants

In addition to the criteria pollutants, another group of substances, called Toxic Air Contaminants (TACs), are known to be highly injurious, even in small quantities. Examples include certain chlorinated hydrocarbons, certain metals, and asbestos. There are hundreds of substances which may be toxic when inhaled, but air quality standards have not been set for most of them. Regulatory agencies currently monitor ambient air for only a few TACs. The EPA and ARB are studying a number of TACs for possible regulatory action. Among the TACs under review is diesel exhaust, commonly associated with urban buses. Appendix C summarizes the status in the review process of the TACs being studied. To date, the emissions of five such pollutants are being regulated by the BAAQMD: asbestos, beryllium, mercury, benzene and vinyl chloride.

Regional. The BAAQMD issued an Air Toxics Risk Screening Policy and a Risk Management Policy in February 1988, which address toxic air contaminants.[3] The BAAQMD is authorized to require permits for sources that generate toxic air emissions. Since there are no specific emission or concentration standards for most TACs, the BAAQMD evaluates a project based upon a worst-case evaluation of the health risks of the project's TAC emissions.

The BAAQMD requires that a Risk Screening Analysis (RSA) be prepared for any project with the potential to affect public health, and BAAQMD staff review an RSA to determine whether a proposed project would have a significant or an insignificant public health effect.

State. The first piece of legislation in California to deal with ambient toxics was Assembly Bill 1807 (known as the Tanner Bill), adopted in 1983. The Tanner Bill set up a statewide process to determine the need for and methods to set standards for toxic air contaminants. The legislative intent of the law is:

- to identify toxic air contaminants;
- to determine priorities for control;
- to achieve early control;
- to promote advanced control technologies and alternative processes;
- to assist local air pollution control districts; and
- to provide a consistent level of protection throughout the state.

Pursuant to the provisions of AB 1807, the ARB has identified the following as toxic air contaminants:[4]

Asbestos
Benzene
Cadmium
Carbon tetrachloride
Chlorinated dioxins
Dibenzofurans (15 species)
Chloroform
Chromium (VI)
Ethylene dibromide
Ethylene dichloride
Ethylene oxide
Inorganic arsenic
Methylene chloride
Trichloroethylene
Vinyl chloride

An additional 32 substances are currently being reviewed for possible inclusion on the toxic air contaminants list. The ARB prepared a revised toxic air contaminants list in December of 1990.

The Air Toxic "Hot Spots" Information and Assessment Act of 1987 (AB 2588) requires specified facilities to submit to the local air pollution control agency a comprehensive plan to develop an inventory of air toxic emissions for a specified list of substances. After the inventory preparation plan is approved, the facility must implement the plan and submit the resulting facility air toxic emission inventory to the agency. The goals of the Air Toxics Hot Spots Act are to collect toxic

air emissions data, identify facilities having localized impacts, determine health risks, and notify nearby residents of significant risks.

Federal. Prior to the passage of the federal Clean Air Act Amendments in November of 1990, the National Emission Standards for Hazardous Air Pollutants (NESHAP) governed emissions of asbestos, beryllium, mercury, and vinyl chloride from specific sources. These standards were a combination of limiting regulations and administrative regulations. The NESHAP provided specific emission limits in addition to design and operation specifications. Administrative reporting and monitoring requirements under NESHAP are extensive. These regulations apply to both existing and new facilities. The standards were developed solely on health consideration and do not consider economic effects. Under Title III of the federal Clean Air Act Amendments, adopted in November of 1991, the law related to TACs was expanded to include a total of 190 pollutants.

Air Pollutant Problems and Trends - Bay Area

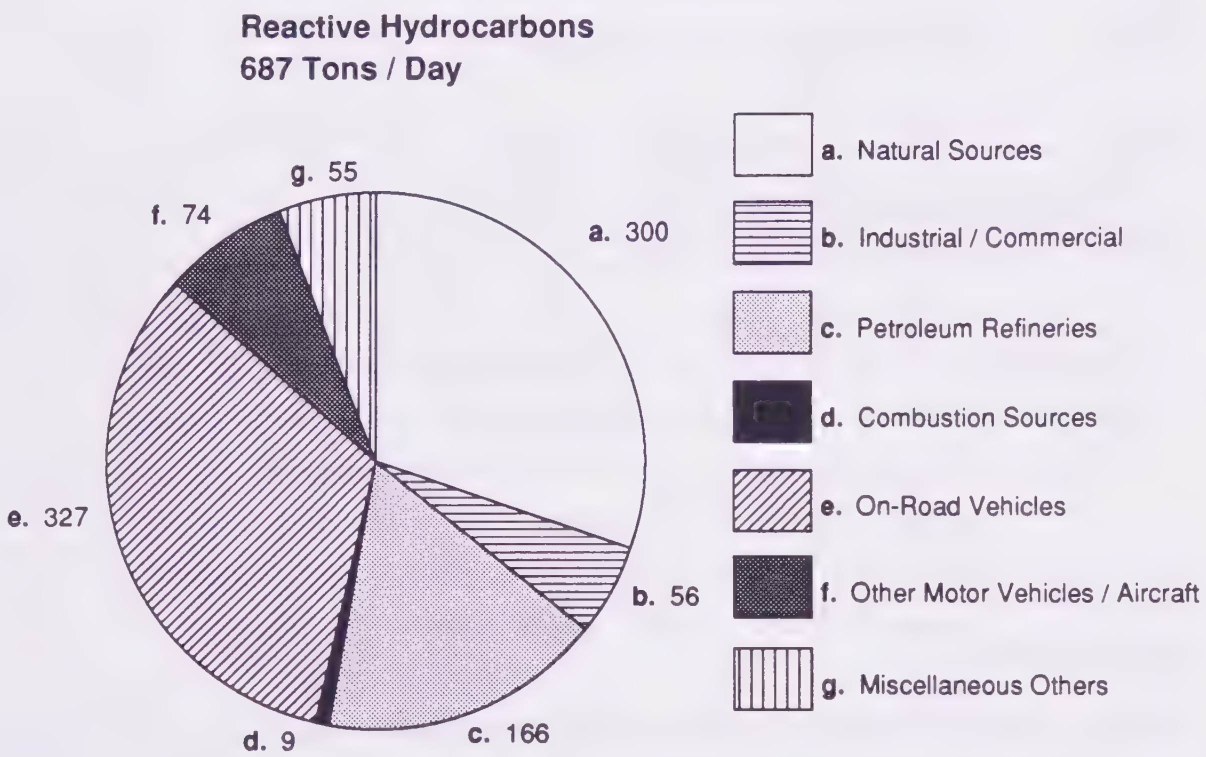
Criteria Pollutants

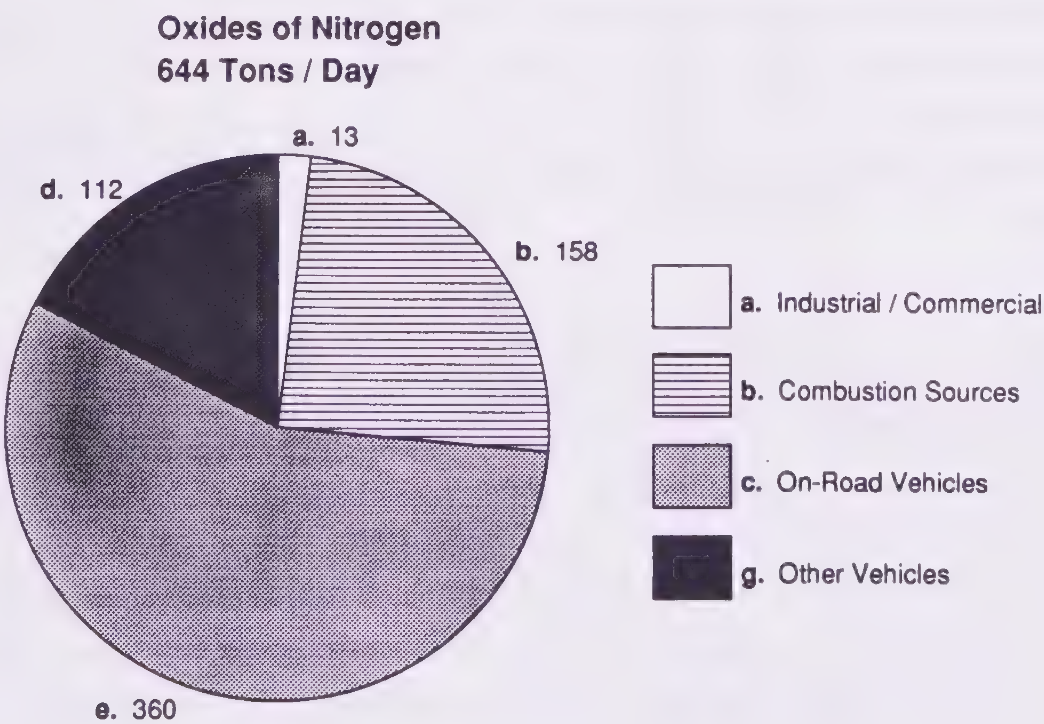
Present air quality problems come as a result of extensive industrial and urban development, especially from the widespread and intensive use of motor vehicles by Basin residents. Topographic and meteorological conditions often reduce the ability of the atmosphere to disperse air pollutants thereby allowing such pollutants to attain relatively high ambient concentrations. The criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, suspended particulate matter (PM_{10}), sulfates, lead, hydrogen sulfide, vinyl chloride (chloroethane) and visibility reducing particles.

Regionally, the most severe and complex air quality problem is the relatively high level of ambient ozone experienced during warm, meteorologically stable periods in the summer and autumn. Ozone is not emitted directly from pollutant sources, but is formed in the atmosphere through a complex series of photochemical reactions involving reactive organic compounds (ROG, also referred to as reactive hydrocarbons, or RHC) and nitrogen oxides (NO_x). Motor vehicles account for the majority of the ROG and NO_x emissions. Figure 4.1-1 shows the contributions of different sources of ozone precursors in the Bay Area for the year 1987. Although the Bay Area's highest ozone levels can fluctuate from year to year, standards are exceeded most often in the Santa Clara,

1987 EMISSIONS OF OZONE PRECURSORS IN THE BAY AREA:
REACTIVE HYDROCARBONS AND OXIDES OF NITROGEN

FIGURE 4.1-1





SOURCE: BAY AREA '91 CLEAN AIR PLAN, APRIL 1991

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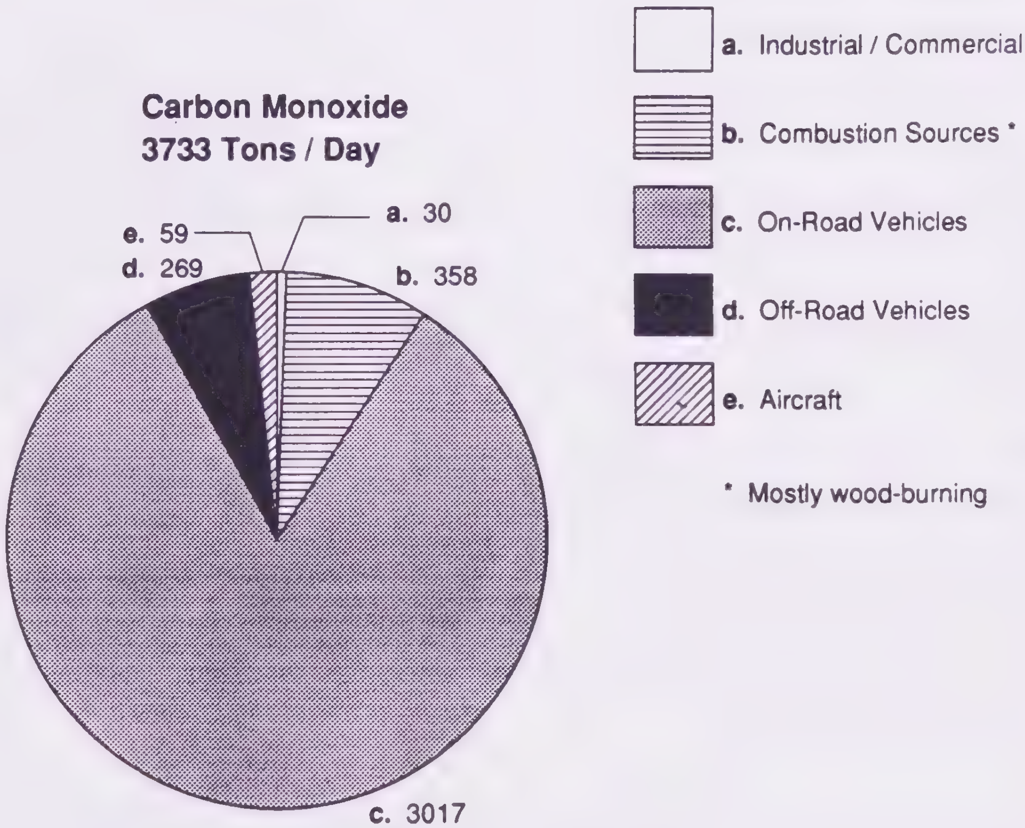
Livermore, and Diablo valleys. Based on emission inventories prepared by the BAAQMD, about 50 percent of ozone precursors are generated by motor vehicles.

In contrast to ozone, carbon monoxide (CO) is a sub-regional problem in the Bay Area, because CO is a non-reactive pollutant with one major source, motor vehicles. Figure 4.1-2 shows the contributions of different sources of CO in the Bay Area for the year 1987. Based on emission inventories prepared by the BAAQMD, about 85 percent of CO is generated by motor vehicles in the Bay Area. Ambient CO distributions closely follow the spatial and temporal distributions of vehicular traffic, and are strongly influenced by meteorological factors such as wind speed and atmospheric stability. The one-hour and eight-hour CO standards are occasionally exceeded in those parts of the Bay Area subject to a combination of high traffic density and susceptibility to the occurrence of surface based radiation inversions[5] during the winter months. From 1987 to 1989, three sub-areas of the Bay Area were identified for exceedances of the CO air quality standards, San Francisco, San Jose and Vallejo.

Particulate levels in the Bay Area typically show a pattern of low values near the coast. They increase with distance inland and reach their highest levels in dry, sheltered valleys, such as the Santa Clara, Diablo, and Livermore Valleys. The most important anthropogenic sources in the Bay Area are demolition and construction activity, and motor vehicle travel over paved and unpaved roads. However, agricultural operations and burning can contribute significantly to particulate concentrations in rural areas.

The major sources of oxides of nitrogen (NO_x compounds), which have an important role in the formation of ozone, are vehicular, residential, and commercial fuel combustion (see Figure 4.1-1). Concentrations of NO_2, the most abundant form of ambient NO_x, are highest in the South Bay, where the standard was last exceeded in 1980. The NO_2 standard has not been recorded in exceedance of the standard at any monitoring station in the Bay Area since that time.

The burning of high sulfur fuels for activities such as electricity generation, petroleum refining, and shipping are the major sources of ambient SO_2. The highest levels of SO_2 are recorded by monitoring stations located in a relatively narrow crescent centered on the bayshore of northern



SOURCE: BAY AREA 1991 CLEAN AIR PLAN, APRIL 1991

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Contra Costa County, where the major sources are located. Bay Area seasonal maximums rarely exceed 50 percent of the standard, and SO_2 levels at most Bay Area monitoring stations are less than 10 percent of the standard. The SO_2 standard is currently being met throughout the Bay Area.

The BAAQMD operates a regional air quality monitoring network in order to gauge the Bay Area's progress toward attainment of federal and State ambient air quality standards (see Figure 4.1-3). At monitoring stations throughout this network, concentrations of the five major criteria air pollutants are measured regularly. Ozone and CO trends in the Bay Area are presented in Figures 3-2 and 3-3 for the years 1979 through 1990.

An eight-year summary of the data collected for the San Francisco Bay Area Air Basin is shown in Table 4.1-1. The data in Table 4.1-1 reveals 14 violations of the State ozone standard, and two violations of the federal ozone standard, in 1990. State and federal 1-hour CO standards were not violated in 1990, while two violations of the 8-hour standards were recorded.

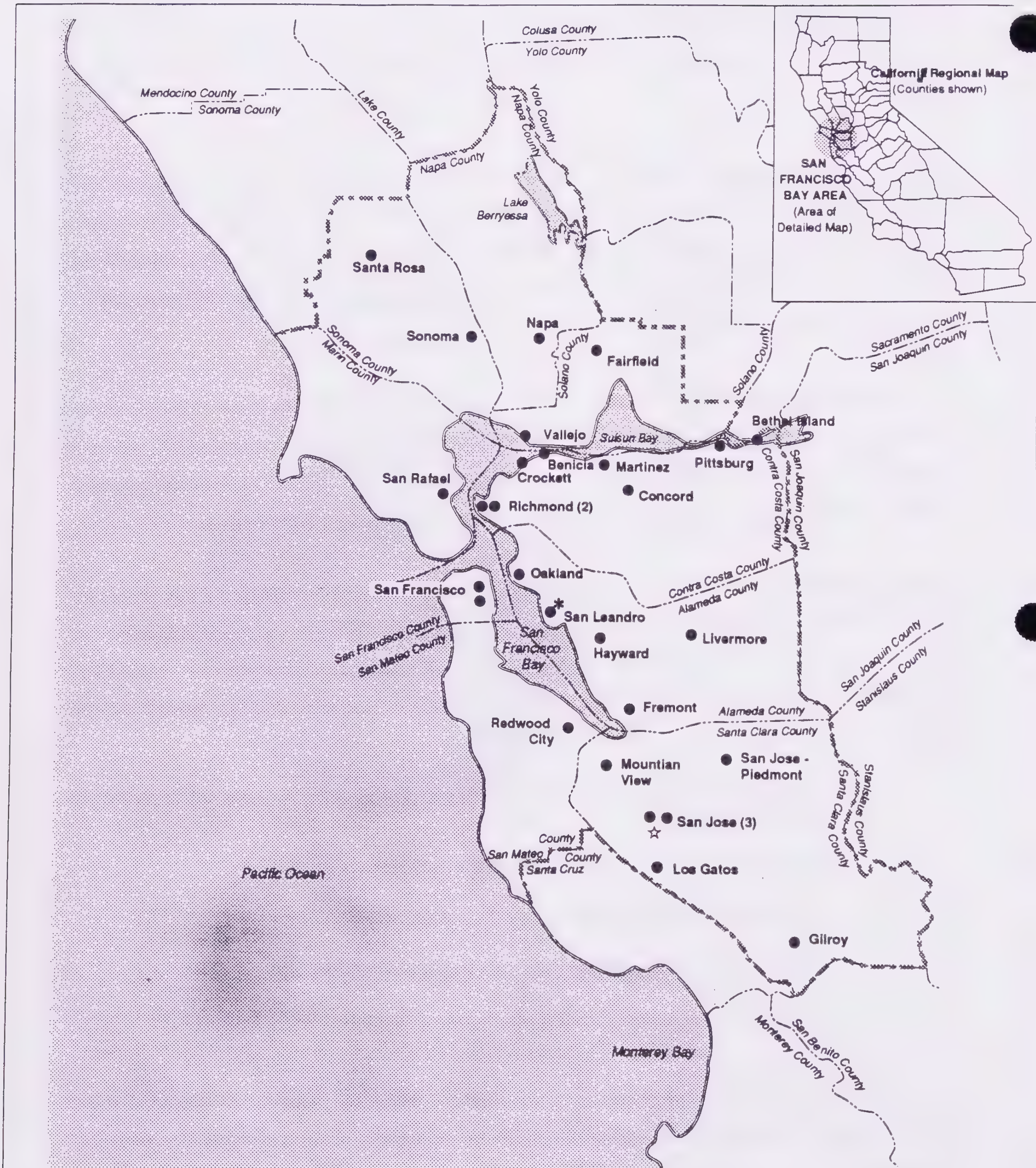
Emission reductions in the future are anticipated even without implementation of the proposed project. Table 4.1-2 provides a baseline showing emission reductions based on emission inventories for the future years, 1994, 1997, and 2000. The emission inventories presented in Table 4.1-2 assume that the Bay Area will continue to grow as forecast and that all currently adopted control measures will continue. Among these assumptions are:

- population, housing, employment, economic growth and land use will increase as regionally forecast;
- cars will become cleaner as required by California regulations;
- the recently improved "Smog Check" program will continue;
- controls on industry and business will continue in force; and
- currently implemented transportation control measures will continue.

The daily emissions presented in Table 4.1-2 are used by the ARB to calculate the percentage emission reductions from the CAP and determine if the attainment plan meets emission reduction requirements.

SAN FRANCISCO BAY AREA AIR BASIN MONITORING STATIONS FOR CRITERIA POLLUTANTS

FIGURE 4.1-3



BAAQMD Jurisdiction

● Gaseous pollutant or multipollutant monitoring site

☆ Particulate sampling only

* Discontinued during year

SOURCE: DRAFT TOXIC AIR CONTAINMANT REDUCTION PLAN, BAY AREA AIR QUALITY MANAGEMENT DISTRICT, MARCH 25, 1991

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TABLE 4.1-1

BAY AREA AIR POLLUTANT DATA SUMMARY, 1983-1990

Pollutant	Standard	1983	1984	1985	1986	1987	1988	1989	1990
OZONE:									
Highest 1-hour (ppm)		0.20	0.17	0.16	0.14	0.17	0.15	0.14	0.13
Days > 0.09	State	53	55	45	39	46	41	22	14
Days > 0.12 ppm	Federal	21	22	9	5	14	5	4	2
CARBON MONOXIDE									
Highest 1-hour (ppm)		17.0	20.0	21.0	20.0	17.0	15.0	19.0	NA
Days > 20.0 ppm	State	0	0	2	0	0	0	0	0
Days > 35.0 ppm	Federal	0	0	0	0	0	0	0	0
Highest 8-hour		10.6	12.10	16.10	12.60	10.0	12.80	12.0	11.3
Days > 9.0 ppm	State/Federal	4	8	20	8	2	4	10	2
NITROGEN DIOXIDE									
Highest 1-hour (ppm)		0.18	0.18	0.19	0.16	0.17	0.16	0.15	0.15
Days ≥ 0.25 ppm	State	0	0	0	0	0	0	0	0
Annual Mean		0.020	0.022	0.022	0.014	0.021	0.022	0.022	NA
Year > 0.053 ppm	Federal	No	No	No	No	No	No	No	No
SULFUR DIOXIDE									
Highest 1-hour (ppm)		0.24	0.37	0.18	0.12	0.16	0.13	0.09	NA
Days > 0.25 ppm	State	0	1	0	0	0	0	0	NA
Highest 24-hour		0.038	0.050	0.034	0.030	0.028	0.024	0.024	0.013
Days > 0.05 ppm	State	0	0	0	No	No	No	No	0
Annual Mean		0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA
Year > 0.03 ppm	Federal	No	No	No	No	No	No	No	NA
PARTICULATES (PM_{10})									
Highest 24-hour (ppm)		NM	67	181	122	112	146	150	NA
Days > 50 ug/m^3	State	NM	3	24	26	26	32	51	15
Days > 150 ug/m^3	Federal	NM	0	2	0	0	0	0	1

Units: ppm = parts per million; ug/m^3 = micrograms per cubic meter;
NM = not monitored;
* = Data presented are valid, but incomplete in that an insufficient number of valid data points were collected to meet EPA and/or ARB criteria for statistical significance;

NA = Not Available.

Sources: California Air Resources Board, Air Quality Data Summary, 1986-1989.
BAAQMD, Air Pollution in the Bay Area By Station and Contaminant: 1990.

TABLE 4.1-2

BAY AREA EMISSION INVENTORY TRENDS
WITHOUT IMPLEMENTATION OF THE CAP

	1987			1994			1997			2000		
Emission Sources	RHC	NO_x	CO	RHC	NO_x	CO	RHC	NO_x	CO	RHC	NO_x	CO
Industrial Commercial Processes/Facilities												
Petroleum Refining Facilities	29	11	2	30	12	2	31	13	2	32	13	2
Chemical Manufacturing Facilities	5	2	28	5	2	31	6	2	33	6	3	34
Other	22	0	0	16	1	0	17	1	0	18	1	0
Petroleum Product/Solvent Evaporation												
Fuels Refinery Evaporation	10	0	0	6	0	0	6	0	0	6	0	0
Fuels Distribution	24	0	0	24	0	0	25	0	0	25	0	0
Other	132	0	0	130	0	0	138	0	0	144	0	0
Combustion - Stationary Sources												
Fuels Combustion	8	157	356	8	150	388	9	156	401	9	164	414
Burning of Waste Material	1	1	2	1	1	2	1	7	8	1	7	8
Miscellaneous - Other Sources	55	0	0	50	0	0	51	0	0	51	0	0
Subtotal Stationary Sources	**286**	**172**	**388**	**270**	**165**	**423**	**284**	**179**	**449**	**292**	**187**	**459**
Combustion - Mobile Sources												
Off-Highway Mobile Sources	57	96	269	65	112	310	63	119	328	63	124	342
Aircraft	17	16	59	18	18	68	19	18	72	18	19	74
On-Road Motor Vehicles	327	360	3,017	166	248	2,249	137	222	1,939	110	202	1,688
Subtotal Mobile Sources	**401**	**472**	**3,345**	**249**	**378**	**2,627**	**219**	**359**	**2,339**	**191**	**345**	**2,104**
Grand Total	**687**	**644**	**3,733**	**519**	**543**	**3,050**	**501**	**538**	**2,783**	**483**	**532**	**2,562**

Note: Actual data for 1987; other years forecasted.

Source: 1991 CAP, p. 16.

Transport of Pollutants

The CCAA (Section 39610[a]) directs the ARB to "identify each district in which transported air pollutants from upwind areas outside the district cause or contribute to a violation of the ozone standard and to identify the district of origin of transported pollutants." The information regarding the transport of air pollutants from one basin to another was quantified to assist both interrelated basins in the preparation of plans for the attainment of state ambient air quality standards, as mandated under the CCAA.

The results of numerous studies conducted by the ARB identified air basins with air quality impacts from pollutants transported from other air basins and potential transport corridors requiring further research. Among the air basins affected by air pollution transport from the Bay Area are: the North Central Coast Air Basin, lying to the south of the Bay Area; the San Joaquin Valley Air Basin lying to the south-east of the Bay Area; and the Broader Sacramento Area, lying to the north-east of the Bay Area. The Bay Area was also identified as an area impacted by the transport of air pollutants from the Broader Sacramento Area.

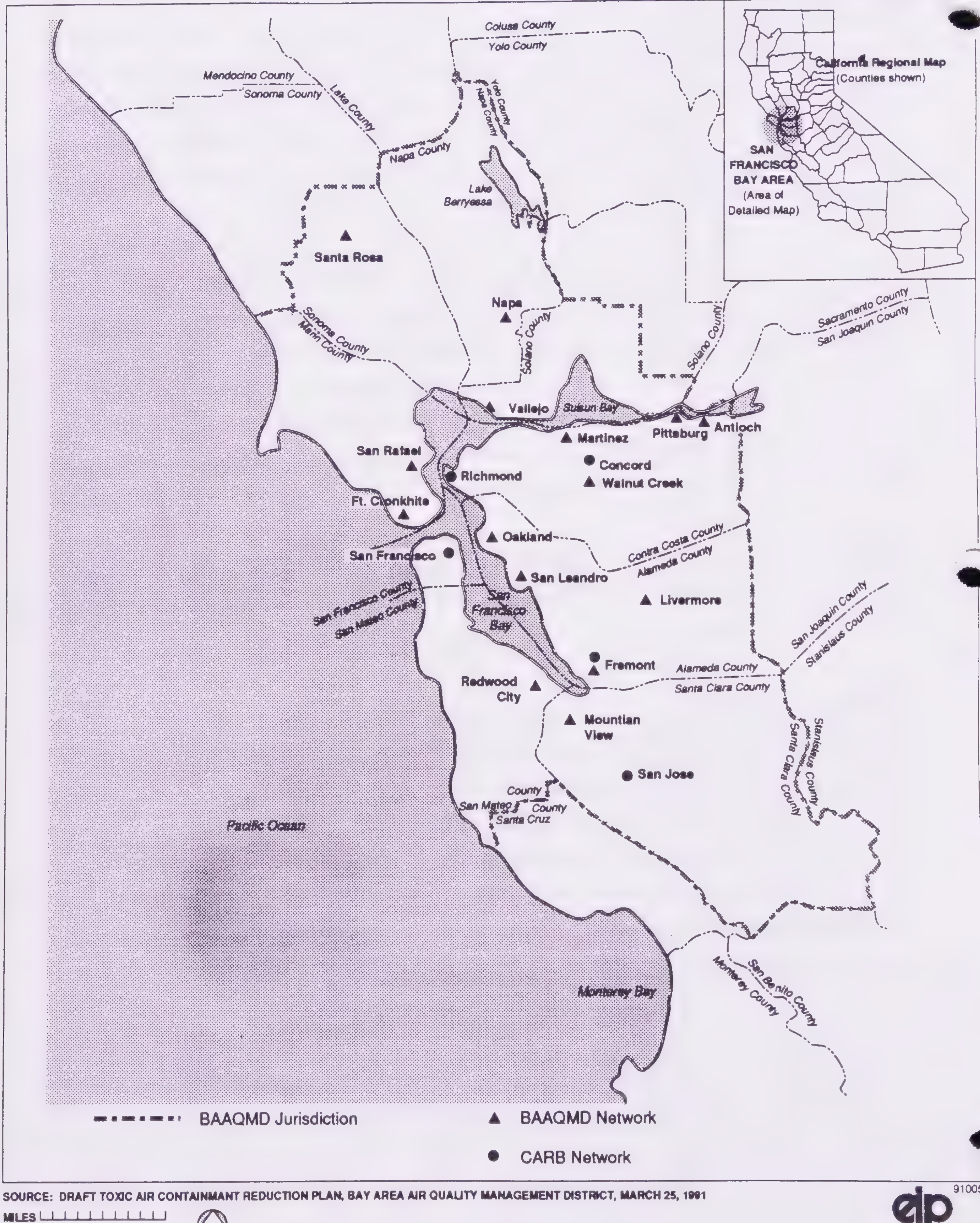
Other possible transport corridors being studied by the ARB are from the Bay Area to the Upper Sacramento Valley and Mountain Counties Air Basin, and from the Upper Sacramento Valley Air Basin to the Bay Area.

Toxic Air Contaminants

The BAAQMD has recently established a number of monitors to track ambient levels of eleven potential toxic air pollutants: benzene, 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), chloroform (TCM), 1,2-dichloroethane (EDC), 1,2-dibromoethane (EDB), methylene dichloride (DCM), carbon tetrachloride, tetrachloroethylene (perc), vinyl chloride, and toluene (see Figure 4.1-4). Table 4.1-3 gives a summary of the annual averages of the measured concentrations for monitoring stations located throughout the Bay Area. No State or federal ambient concentration standards have been established for these compounds to date.

SAN FRANCISCO BAY AREA AIR BASIN
MONITORING STATIONS FOR TOXIC AIR CONTAMINANTS

FIGURE 4.1-4



SOURCE: DRAFT TOXIC AIR CONTAINMANT REDUCTION PLAN, BAY AREA AIR QUALITY MANAGEMENT DISTRICT, MARCH 25, 1991

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TABLE 4.1-3

TOXIC AIR POLLUTANT DATA SUMMARY FOR BAY AREA:
AVERAGE CONCENTRATIONS[1]
(Parts per billion)

	Concord		Fremont		Richmond		San Francisco		San Jose	
	Value	Number of Readings	Value	Number of Readings	Value	Number of Readings	Value	Number of Readings	Value	Number of Readings
Trichloroethane	0.055	21	0.141	23	0.402	23	0.088	18	0.105	22
Acetaldehyde	1.90	21	1.73	21	1.19	20	1.96	18	1.63	20
Benzene	1.89	24	1.68	22	1.60	22	1.69	19	3.59	22
Benzo(a)pyrene	0.593	16	0.040	8	0.059	7	0.321	14	1.01	15
1,3-Butadiene	0.237	20	0.209	22	0.158	20	0.203	18	0.420	20
Carbon Tetrachloride	0.158	23	0.123	24	0.123	24	0.118	19	0.120	24
Chloroform	0.035	23	0.020	24	0.040	23	0.028	19	0.025	24
Ethylene Dibromide	0.005	23	0.005	24	0.005	23	0.005	19	0.005	22
Ethylene Dichloride	0.10	23	0.10	23	0.10	21	0.10	19	0.10	22
Formaldehyde	3.79	24	3.13	25	2.48	24	2.99	22	3.29	24
Methyl Chloroform	0.472	18	4.20	19	1.04	21	0.972	16	1.17	24
Methylene Chloride	0.70	22	0.65	23	0.94	24	2.51	19	0.80	22
Perchloroethylene	0.746	21	0.287	23	0.[illegible]10	23	0.219	17	0.229	22

[1] Monitoring conducted from July 1988 through June 1989.

Source: California Air Resources Board, Technical Support Division, Air Quality Data Review, unpublished, November 1, 1990.

Global Warming and Stratospheric Ozone Depletion

Global warming and stratospheric ozone depletion are two issues which have gained increased public attention over the last decade. Unlike emissions of criteria and toxic air pollutants which have local or regional impacts, air emissions contributing to global warming and ozone depletion have a broader, global impact.

Global warming is a process whereby "greenhouse gases" contribute to an increase in the temperature of the earth's atmosphere. Greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), ozone (O_3), and water vapor, and they are predominately anthropogenic. These gases allow visible and ultraviolet light from the sun to pass through the atmosphere, but they absorb infrared radiation and prevent the escape of heat from the earth's surface into space. The glass in a greenhouse works in much the same way, keeping the inside of the greenhouse warm in comparison to the outside. Among the potential implications of global warming are rising sea levels and adverse impacts to agriculture, forestry, and natural habitats. In addition, global warming may increase electricity demand for cooling, decrease the availability of hydroelectric power, and affect regional air quality and human health.

One group of greenhouse gases, chlorinated fluorocarbons (CFCs), in addition to causing global warming, also depletes the stratospheric, or upper atmospheric, ozone. Stratospheric ozone acts as a solar radiation screen, reducing shortwave, ultraviolet radiation, which can cause human skin cancer, damage agricultural crops, and increase photochemical smog. By depleting ozone in the upper atmosphere, the CFCs allow more shortwave, ultraviolet radiation to enter the earth's atmosphere. Since the mid-1930s, CFCs have been used as refrigerants, solvents, and in the production of foam materials. CFCs survive in the atmosphere for decades. As greenhouse gases these chemicals are several thousand times more effective than CO_2 in trapping infrared radiation.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

Emission of air pollutants, both criteria and toxic air contaminants, have sources in almost every facet of daily life. Residences generate air pollutants directly or indirectly from a variety of activities: the combustion of natural gas, to cook food and heat water and air; the use of electrical appliances; and the use of solvents, such as paints and household cleaning solutions. Electricity

consumption results in emissions from combustion of fossil fuels at electrical generating utilities (with the exception of non-fossil fueled power plants). Commercial establishments, such as retail outlets, restaurants and office buildings emit air pollutants for activities that are similar to those discussed for residences. Among the sources of air pollutants at industrial facilities are emissions from the combustion of fossil fuels to process materials, and emissions from the application of coatings, use of solvents, and processing of hydrocarbons at refineries and chemical plants. Finally, air pollutant emissions are generated in the transportation sector, from the combustion of fossil fuels in automobiles, airplanes and boats.

Standards of Significance

Criteria used to determine the significance of an impact are broadly defined in CEQA. While the BAAQMD's Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans contains specific guidelines for determination of the significance of an air quality impact for project EIRs; no similar guidelines exist for program EIRs.[6] Both CEQA and BAAQMD definitions of significance follow.

Criteria Pollutants

Air quality impacts can be classified as having effects either on regional or local scale. The CEQA Guidelines indicate that a project would have a significant effect if it would violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations. Impacts that would violate federal standards (i.e., primary standards designed to safeguard sensitive receptors or secondary standards to safeguard public health) or State standards are considered significant adverse impacts. Additionally, a project would be considered to have a significant effect if it would violate any BAAQMD regulations.

The BAAQMD identifies five tests to assess significance of impacts in the Air Quality and Urban Development Guidelines for Assessing Impacts of Project and Plans. These are:[7]

Test 1: Carbon monoxide emissions from any plan or project, which when added to background levels would result in CO concentrations above the State or federal standards.

Test 2: A plan or project would be found to have a significant impact if the total direct and indirect emissions, other than CO, equals or exceeds emission levels set by the BAAQMD to trigger Best Available Control Technology (BACT) requirements for a stationary source (Rule 2-2-301.1 of BAAQMD Rules and Regulations).

Test 3: Any plan or project would be found to have a significant impact if emission of criteria pollutants from combined direct and indirect sources equals or exceeds one percent of county emissions for a particular pollutant. For plans or projects with only indirect sources of emissions, exceedances of one percent of the transportation-related emissions of the county would constitute a significant impact.

Test 4: Any stationary source in which modeling determines that concentrations of any contaminant equal or exceed standards would be considered to have a significant impact.

Test 5: Population or employment projections for a sub-region, resulting from a plan or a project, which exceed the projections forecast in ABAG's projections to have a significant adverse impact. This impact would result from a "lack of consistency or conformity with the Bay Area Air Quality Plan."

Toxic Air Contaminants

Since there are no ambient concentration standards for most toxic air contaminants, the evaluation of significance is based upon health risk analysis. The BAAQMD's Risk Management Policy states that a project will be considered insignificant if the results of a Risk Screening Analysis of the project show that the project would meet both of the following screening criteria:

1. The project has a cancer risk of less than one in one million.

2. Ground-level concentrations of pollutants emitted by the project do not exceed relevant non-cancer effect criteria.[8]

A cancer risk of one in one million means that if the maximally-exposed (i.e., exposed without interruption) person were to breath the emissions from the project over a lifetime (for 70 years), his/her chance of contracting cancer would increase by one chance in one million.

Non-cancer effect criteria apply to non-carcinogenic compounds. For example, 1,1,1-trichloroethane may cause neurological effects. The BAAQMD publishes concentrations for such chemicals, which include a margin of safety.

Risk Screening Analyses use worst-case assumptions which usually overstate the potential health risks of a project. This conservatism creates an additional margin of safety for the BAAQMD's consideration of a project.

Projects which are not "insignificant" under these criteria must undergo either a refined Risk Screening Analysis that shows an insubstantial health risk or a Formal Risk Assessment. A Formal Risk Assessment is a more thorough and detailed analysis of a project. The BAAQMD's Permit Services Division will recommend disapproval of a project if any one of the following criteria are met:

1. Project cancer risk is greater than 10 in one million.
2. Project cancer burden (defined below) is greater than one.
3. Project cancer risk is greater than one in one million and Toxic Best Available Control Technology (TBACT) is not applied.
4. Ground-level concentrations of pollutants emitted by the project exceed relevant non-cancer effect criteria.[9]

"Project cancer burden" refers to the estimated risk of cancer for the exposed population. It is the multiplicative product of the cancer risk and the number of people exposed. For example, if the cancer risk is 10 in one million, and one hundred thousand people would be exposed to this risk, then the excess cancer burden would be one.

Overview of Emissions Reductions Resulting from Implementation of the CAP

Impact

4.1-1 **Implementation of the proposed project would result in a beneficial effect on air quality through a net reduction in emissions of carbon monoxide and ozone precursors (reactive hydrocarbons and oxides of nitrogen) from mobile and stationary sources.**

Emission reductions from the CAP would result from the implementation of 48 stationary source control measures (including one contingency measure), 21 TCMs proposed for adoption before 1997, six other mobile-source measures (including three contingency measures), and additional market-based TCMs proposed for adoption after 1997. Table 4.1-4 presents the maximum emission

reductions of reactive hydrocarbons, oxides of nitrogen and carbon monoxide from the CAP. These emission reductions are subtracted from the baseline to determine the total daily emissions after implementation of the CAP. Table 4.1-4 also presents this information on a subregional basis for carbon monoxide emissions in the cities of San Francisco, San Jose and Vallejo.

The CCAA (Section 40920) requires that "severe" areas include in their nonattainment plans "measures sufficient to reduce overall population exposure to ambient pollutant levels in excess of the standard by at least 25 percent by December 31, 1994, 40 percent by December 31, 1997, and 50 percent by December 31, 2000, based on average per capita exposures and the severity of the exceedances, so as to minimize health impacts, using the average level of exposure experienced during 1986 through 1988 as the baseline."

Emissions reductions resulting from the California motor vehicle emission control programs, existing stationary source control measures and the CAP are expected to produce major reductions in population exposure to unhealthy levels of ozone during the 1990s. Preliminary calculations, based both on photochemical modeling and on analysis of historical trends in emissions and air quality, suggest that the Bay Area will easily meet the 1994, 1997 and 2000 CCAA targets. Photochemical modeling indicates that by 1997 Bay Area population exposure to levels of ozone over the California standard will be reduced by at least 80 percent from 1989 levels.[10] The modeling results are considered preliminary because they are based on only one set of meteorological conditions. Simulations of other conditions, however, are expected to produce similar results.

Although implementation of the CAP would reduce the net emission of ozone precursors and CO, some control measures could have other air quality impacts, some adverse and others beneficial.

An example of an adverse air quality impact from a transportation control measure would be an increase in particulate matter due to construction of HOV lanes. A beneficial effect from shifting to more energy efficient modes of transportation would be the reduction in emissions of carbon dioxide, a greenhouse gas. The adverse impacts and beneficial effects of the CAP on air quality in the Bay Area for each mobile and stationary source control measure are explored below.

TABLE 4.1-4

CAP EMISSION REDUCTIONS
(Tons/Day)

	1994			1997			2000		
Bay Area	Baseline	CAP Reduction	After CAP Total	Baseline	CAP Reduction	After CAP Total	Baseline	CAP Reduction	After CAP Total
Reactive Hydrocarbons	519	39	480	501	64	437	483	88	395
Oxides of Nitrogen	543	25	518	538	108	430	532	136	396
Carbon Monoxide by Subregion									
San Francisco	193	32	161	161	35	126	--	--	--
San Jose	334	55	279	288	62	226	--	--	--
Vallejo	22.8	3.8	19	20.4	4.4	16	--	--	--

Source: 1991 CAP, pp. 31, 62.

Mitigation Measure

4.1-1 *None recommended or required.*

Impact

4.1-2 **Implementation of the proposed project could result in localized ozone exceedances which would be considered a significant and adverse air quality impact.**

The implementation of control measures to reduce emissions of NO_x, an ozone precursor, may result in ozone "hotspots," or localized areas with high ozone levels. Air quality modeling studies indicate that reducing emissions of NO_x can lead to a regional lowering of ozone levels while causing localized increases in ozone, or "hotspots."[11] Emissions of oxides of nitrogen (NO_x) are composed of more than 90 percent nitrogen oxide (NO). Nitrogen oxide (NO) reacts with (consumes) ozone to produce nitrogen dioxide and oxygen. This reaction is represented by the chemical equation: $NO + O_3 => NO_2 + O_2$. Once most of the NO is converted to NO_2, the chemical reaction is reversed with oxygen combining with nitrogen dioxide to produce ozone and nitrogen oxide.

Mitigation Measure

4.1-2 *Prior to adoption of control measures to reduce NO_x emissions, the BAAQMD would perform air quality modeling to evaluate ozone "hotspots" and to identify potential mitigation measures. Because mitigation is uncertain, this potentially significant impact is considered to be unavoidable at this time.*

Mobile Source Control Measures

Overview of Mobile Source Control Measure Impacts on Air Quality

Impact

4.1-3 **Implementation of the mobile source control measures would result in a beneficial effect on air quality through a net reduction in emissions of carbon monoxide, reactive hydrocarbons, oxides of nitrogen, particulates and carbon dioxide from mobile sources.**

Implementation of the TCMs outlined in the CAP would have a net beneficial air quality effect. Because mobile sources in the Bay Area generate approximately 40 percent of the reactive hydrocarbons, 75 percent of the NO_x, and 90 percent of the CO, emission reductions in this category are of critical importance. Implementation of the TCM control measures would occur in three phases, Phase I measures being adopted before 1994, Phase 2 measures adopted before 1997 and Phase 3 measures adopted after 1997. The emission reductions anticipated from the adoption of the TCMs are presented in Table 4.1-5. Table 4.1-5 shows an increasingly larger reduction in emissions of reactive hydrocarbons, NO_x and CO with each successive phase, with reductions occurring in Phase 3 providing the bulk of the emission reductions.

Emission reductions from mobile sources fall into eight categories:

- Employer-Based Trip Reduction Measures;
- Mobility Improvements;
- Traffic Operation Management Control Measures;
- User Incentives;
- Indirect Source Review Measures;
- Implementation Support Measures;
- Motor Vehicle Control Measures; and
- Market-Based Transportation Control Measures.

In addition to reduced emissions of the ozone precursors and CO, the TCMs would reduce emissions of particulates and CO_2. These reductions have been quantified for each TCM in Table 4.1-5. Two sources of particulates result from the use of motor vehicles: particulates emitted from the combustion exhaust and particulates entrained in the air by the turbulence created as motor vehicles pass over the ground. Reduction in overall VMT from implementation of the CAP would consequently reduce particulates.

Mobile sources generate carbon dioxide emissions in the combustion of fossil fuels. Typically, CO_2 emissions from mobile sources are associated with the combustion of gasoline or diesel fuel in

TABLE 4.1-5

MOBILE SOURCE EMISSION REDUCTIONS
FROM IMPLEMENTATION OF THE CAP

TCM Description	Daily Percentage Emission Reductions				
	HC	CO	NO_x	PM_{10}	CO_2
Phase 1					
1 Employer Assistance Programs	0.18	0.17	0.18	0.20	0.20
2 Employer-Based Trip Reduction Rule	3.57	3.76	3.67	3.27	3.27
3 Improve Areawide Transit Service	0.46	0.44	0.46	0.48	0.48
4 Expand New Rail Starts	0.06	0.06	0.06	0.07	0.07
5 Improve Access to Rail Systems	0.02	0.03	0.02	0.02	0.02
6 Improve Intercity Rail Service	0.05	0.04	0.05	0.05	0.05
7 Improve Ferry Service	0.015	0.011	0.012	0.015	0.015
8 Construct Carpool/Express Buslanes on Freeways	0.23	0.20	0.22	0.23	0.23
9 Improve Bicycle Access	0.01	0.01	0.01	0.01	0.01
10 Youth Transportation	0.00	0.00	0.00	0.00	0.00
11 Install Freeway Traffic Operations (TOS)	0.42	0.65	0.35	-0.02	0.45
12 Improve Arterial Traffic Management	0.20	0.30	0.25	0.00	0.15
13 Reduce Transit Fares	0.11	0.09	0.11	0.11	0.11
14 Vanpool Liability Insurance	0.00	0.00	0.00	0.00	0.00
15 Provide Carpool Incentives	0.00	0.00	0.00	0.00	0.00
16 Adopt Indirect Source Control Program	0.70	0.70	0.70	0.70	0.70
17 Conduct Public Education	0.00	0.00	0.00	0.00	0.00
18 Zoning Plans for Higher Densities Near Transit Stations	0.00	0.00	0.00	0.00	0.00
19 Air Quality Elements for General Plans	0.00	0.00	0.00	0.00	0.00
20 Conduct Demonstration Projects	0.00	0.00	0.00	0.00	0.00
21 Implement Revenue Measures	0.60	0.57	0.60	0.62	0.62
Total	6.48	6.86	6.54	5.64	5.64
Phase 2					
1 Employer Assistance Programs	--	--	--	--	--
2 Employer-Based Trip Reduction Rule	--	--	--	--	--
3 Improve Areawide Transit Service	1.00	0.90	0.90	1.00	1.00
4 Expand New Rail Starts	0.80	0.80	0.70	0.70	0.70
5 Improve Access to Rail Systems	0.30	0.25	0.30	0.30	0.30
6 Improve Intercity Rail Service	0.04	0.03	0.04	0.04	0.04
7 Improve Ferry Service	0.03	0.02	0.03	0.03	0.03
8 Construct Carpool/Express Buslanes on Freeways	0.41	0.38	0.40	0.45	0.45
9 Improve Bicycle Access	0.02	0.03	0.02	0.02	0.02
10 Youth Transportation	0.14	0.16	0.14	0.11	0.11
11 Install Freeway Traffic Operations (TOS)	1.40	1.80	1.10	-0.13	1.20
12 Improve Arterial Traffic Management	0.23	0.33	0.27	0.01	0.17
13 Reduce Transit Fares	0.21	0.22	0.21	0.17	0.17
14 Vanpool Liability Insurance	0.02	0.01	0.02	0.02	0.02

Table 4.1-5 (Continued)

TCM Description	HC	CO	NO_x	PM_{10}	CO_2
15 Provide Carpool Incentives	0.20	0.20	0.30	0.30	0.30
16 Adopt Indirect Source Control Program	--	--	--	--	--
17 Conduct Public Education	0.00	0.00	0.00	0.00	0.00
18 Zoning Plans for Higher Densities Near Transit Stations	0.05	0.05	0.05	0.05	0.05
19 Air Quality Elements for General Plans	--	--	--	--	--
20 Conduct Demonstration Projects	0.00	0.00	0.00	0.00	0.00
21 Implement Revenue Measures	1.20	1.20	1.30	1.30	1.30
Total	5.90	6.21	5.64	4.29	5.72
Phase 3					
22 Implement Market-Based Measures	20.62	22.54	15.53	13.72	18.93
Total	20.62	22.54	15.53	13.72	18.93

Source: Greig Harvey, Deakin/Harvey/Skabardonis. June 12, 1991.

internal combustion engines; however, CO_2 emissions also occur remotely from power plants burning fossil fuels to provide power to electric buses and trains. Because the TCMs in the CAP would shift the modes of transportation to more efficient modes, less fossil fuels would be consumed, and less CO_2 would be emitted.

Mitigation Measure

4.1-3 *None recommended or required.*

Impacts from Employer-Based Trip Reduction Measures

Impact

4.1-4 **Implementation of TCMs 1 and 2 would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust, a suspected carcinogen. These control measures might have a significant toxic air quality impact.**

Diesel bus exhaust is a suspected carcinogen regulated by the EPA (see Section 4.5, Public Health and Safety, Background and Regulatory Framework - Diesel Exhaust). The EPA has established a limit on diesel exhaust particles of 0.10 grams per brake horse-power-hour for buses constructed after 1991. Buses operating in the Bay Area would be required to meet these standards. Many of the TCMs encourage a shift in transportation from automobiles to mass transit. If this shift greatly increases the use of diesel buses, emissions of diesel exhaust could increase. While exposure to the toxic components of diesel bus exhaust may increase as a result of implementation of the CAP, these increases would be somewhat compensated for in the decrease of other toxic air contaminants. Most notably, benzene emissions would be reduced by implementation of the transportation control measures and adoption of various stationary source control measures. In addition, implementation of Contingency Measure H4, Urban Bus System Electrification, would also reduce emissions and diesel exhaust from urban buses.

Mitigation Measure

The potential toxic air quality impacts from increased emissions of diesel exhaust would be reduced by the implementation of the mitigation measures detailed below, however, this impact would remain significant and unavoidable.

4.1-4(a) *Methanol-fueled or electric buses would be used where transit districts determined they were feasible. (See Impact/Mitigation Measure 4.1-7 regarding use of methanol-fueled vehicles)*

4.1-4(b) *Bus depots, ferry terminals, train stations and other facilities determined by the BAAQMD to result in a high concentration of idling or operating diesel buses would be evaluated to determine if diesel bus emission levels would pose a significant health hazard. If these facilities are found to pose a significant health hazard, the BAAQMD would inform the responsible agencies and encourage them to take actions to reduce this impact.*

Impact

4.1-5 **Implementation of TCMs 1 and 2 would result in an increase in vehicles driving to and from transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a short-term, significant air quality impact.**

Increased ridership on mass transit facilities, encouraged by many of the TCMs, would alter the flow of traffic in the Bay Area. Existing park-and-ride facilities, and those constructed as part of the implementation of the CAP, would increase vehicular traffic in the vicinity of these facilities. Park-and-ride lots would be sited near train stations, ferry terminals and bus depots. Depending on the volume of traffic, the level of congestion and ambient conditions, an exceedance of the State or federal CO standards at local intersections in the vicinity of the park-and-ride lots could occur.

The potential for exceedances of the CO standards in the vicinity of transit facilities will decline in the future due to a number of factors. As newer, cleaner vehicles replace older vehicles with higher emissions, overall CO emissions in the Bay Area and at localized intersections will decline. The use of oxygenated fuels, a requirement under the 1990 federal Clean Air Act Amendments, and TCMs implemented as a result of the CAP will further result in reduced CO levels. Carbon monoxide emissions are estimated to decline by 35 percent between 1987 and 1997 and an additional 10 percent between 1997 and 2000 with no new controls. Oxygenated fuels are expected to reduce CO by an additional 12 percent. Carbon monoxide emissions reductions from TCMs in the CAP are shown in Table 4.1-5. In combination, federal and State regulations to reduce emissions of CO are expected to result in the Bay Area achieving attainment of the State CO standards by the mid-1990s. In spite of the anticipated overall regional decline in ambient CO

concentrations, localized ambient CO concentrations near congested intersections in the vicinity of transit facilities would result in a short-term significant impact.

Mitigation Measure

4.1-5 *The potential localized CO air quality impacts from traffic congestion near transit facilities would be reduced by conducting traffic/air quality analyses for TCMs that would result in an increase in local traffic in the vicinity of transit facilities. If these facilities were found to pose a significant air quality impact, the project sponsor would take actions to reduce this impact, however, this impact would remain significant and unavoidable.*

Impacts from Mobility Improvements

Impact

4.1-6 **Implementation of TCMs 3, 4, 5, 7, 8, and 9 would result in construction-related emissions which could cause local exceedances of federal and/or State air quality standards. This would be a significant impact.**

Construction of facilities to implement TCMs would result in construction-related emissions. These emissions are generated by exhaust from transportation of workers and construction materials to the construction site, exhaust from construction equipment operating at the construction site, and from dust generated by disturbing the soil. Construction activities related to the TCMs include construction of rail extensions (TCMs 3 and 4), parking facilities (TCMs 5 and 7), construction of carpool/express buslanes on freeways (TCM 8), and construction at bicycle paths (TCM 9).

Clearing, excavation and grading operations, construction vehicle traffic on unpaved ground, and wind blowing over exposed earth surfaces generate dust. It is not possible to estimate accurately the PM_{10} concentration that would occur at or adjacent to construction sites because such concentrations are very sensitive to local meteorology and topography, to variations in soil silt and moisture content, and to the level of equipment use. However, EPA measurements made during apartment and shopping center construction provide a rough indication of the rate of particulate emissions. These measurements indicate that approximately 1.2 tons of dust are emitted per acre per month of construction activity.[12] Dust comprised of large particles (i.e., diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This dust is of

concern as a soiling nuisance rather than a health hazard. The remaining fraction (PM_{10}) could be sufficient to violate the federal and State PM_{10} standards in the vicinity of construction sites.

Vehicular and construction equipment exhaust emissions are generated by a variety of gasoline and/or diesel-powered equipment. Exhaust emissions would include those associated with the transport of workers, machinery, and supplies to the project site, as well as those produced on-site by the operation of the construction equipment. Exhaust emissions from the transportation of workers and materials to the construction sites is dependent on numerous factors including the modes of transportation used to reach the site and the distances traveled. Exhaust emissions from construction equipment used at the construction site is related to the energy intensiveness of the construction project and the condition of the construction equipment.

Mitigation Measure

The potential air quality impacts from vehicle and construction equipment emissions would be reduced to a less than significant level impact by the implementation of the mitigation measures described below:

4.1-6(a) *On-site emissions would be reduced by minimizing idling time for all heavy equipment and frequent exhaust system inspections and maintenance.*

4.1-6(b) *The BAAQMD would continue to encourage project sponsors to require contractors to inspect sources of fugitive dust and coordinate control measures. Control measures would include:*

- *Watering exposed soils twice daily with complete site coverage. The frequency of watering should increase if wind speeds exceed 15 mph.*
- *Road sweeping of mud and dust carried onto the street surfaces by construction vehicles.*
- *Covering trucks hauling soil with tarpaulins or other effective covers.*
- *Post-construction revegetation, repaving or soil stabilization of exposed soils to reduce wind erosion.*

Impact

4.1-7 **Implementation of TCM 10 would promote the use of clean fuel vehicles; which would increase emissions of formaldehyde. Formaldehyde is a suspected carcinogen, and thus its emissions could result in a significant adverse air quality impact.**

Methanol-fueled vehicles would exhaust formaldehyde, a toxic air contaminant, at approximately two to five times the levels emitted by gasoline-fueled vehicles. While the combustion of methanol in clean-fuel vehicles would result in the emission of formaldehyde, reductions in other toxic air contaminants occurring from the implementation of the CAP would more than compensate for these increases. Technology to reduce the emission of formaldehyde from methanol-fueled vehicles incorporates a catalyst. Anticipated ARB regulations regarding formaldehyde emissions from methanol fueled vehicles is expected to require certain control technologies to meet limits on formaldehyde emissions from this source.[13] ARB has set a limit of 15 mg/mi of formaldehyde emissions.[14]

Mitigation Measure

4.1-7 *The potential air quality impacts from vehicular emissions of formaldehyde would be reduced by a requirement to have tailpipe catalytic controls installed on clean-fuel vehicles burning methanol. This impact would be significant and unavoidable.*

Impact

4.1-8 **Implementation of TCM 10 could increase fugitive emissions of methane, a greenhouse gas. This would be a significant impact.**

One alternative fuel proposed for clean fuel vehicles is compressed natural gas (CNG). Although the composition of natural gas may vary, it is typically composed of approximately 85 percent methane, 9 percent ethane, 3 percent propane, 2 percent nitrogen, and 1 percent butane.[15] Accidental releases of methane, a greenhouse gas, would contribute to the greenhouse effect. On a per molecule basis, methane is approximately 30 times more effective as a greenhouse gas than CO_2, the most prevalent greenhouse gas.[16] Methane is currently increasing at a rate of 1.1 percent per year, in part due to extraction and transportation of fossil fuels, such as natural gas, coal and petroleum.[17] While increased emissions of methane may result from implementation of this control

measure, reductions in carbon dioxide, a greenhouse gas, from other control measures in the CAP would to some degree compensate for these increases. The storage and use of natural gas is currently subject to stringent regulations. Compliance with existing regulations would help to reduce accidental releases of methane gas.

Mitigation Measure

The potential global climate impacts from increased emissions of methane would be reduced to a less than significant level by the implementation of the mitigation measures detailed below:

4.1-8(a) *ARB would adopt regulations governing the emissions of methane during the transport and combustion of this fuel.*

4.1-8(b) *BAAQMD would adopt regulations governing the emissions of methane during the storage and dispensing of this fuel.*

Impact

4.1-9 **Implementation of TCMs 3, 5, 8, and 10 would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust, a suspected carcinogen. These control measures might have a significant toxic air quality impact.**

See discussion under Impact 4.1-4.

Mitigation Measure

4.1-9 *See Mitigation Measure 4.1-4. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.1-10 **Implementation of TCMs 3 through 8 would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide at nearby intersections. These control measures could have a significant air quality impact.**

See discussion under Impact 4.1-5.

Mitigation Measure

4.1-10 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impacts from Traffic Operation Management Control Measures

Impact

4.1-11 **Implementation of TCMs 11 and 12 would result in a small increase in vehicle miles traveled and consequently an increase in emissions of PM_{10}. This would be a less than significant impact.**

Emission of air pollutants from motor vehicles are based on a number of factors. Among these factors are the vehicle miles traveled (VMT), the fleet mix and the average speed of the vehicles. Because emission factors for a given fleet mix travelling at a given speed are multiplied by the vehicle miles traveled to determine the net emissions, a reduction in the vehicle miles traveled will generally result in a reduction in emissions. Altering the fleet mix from vehicles with high emission factors per passenger mile traveled, such as automobiles, to vehicles with lower emission factors per passenger mile travelled, such as buses and trains, will also result in a reduction in the emission of air pollutants. Finally, emission factors, based on emissions per mile traveled, respond differently to the speed at which the vehicles travel. While the emission of ROGs and CO decrease with increased speeds, emissions of sulfur oxides and particulates are constant and do not very with speed. Emission factors for nitrogen oxides are more complicated, with high emission factors at low speeds, decreasing emissions as speeds increase, reaching a low at approximately 30 or 35 miles per hour, and then increasing emissions again as speeds increase above 35 miles per hour.

The increased emissions of PM_{10} observed for the TCMs in this category are due to a projected increase in VMT. These TCMs are both capable of increasing the capacity of vehicles travelling on the roadways and therefore may increase the VMT. While these proposed TCMs would increase VMT they would also reduce traffic congestion thereby increasing the average speeds in these corridors. This increase in the average speed results in a reduction in emissions which are sensitive to speed, such as ozone precursors and carbon monoxide. Although the implementation of these control measures would result in a slight increase in emissions of PM_{10}, the increase in

emissions would be more than compensated for by the overall reduction in PM_{10} from the other TCMs (see Table 4.1-5).

Mitigation Measure

4.1-11 *None recommended or required.*

Impacts from User Incentives

Impact

4.1-12 **Implementation of TCM 13 would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust, a suspected carcinogen. These control measures might have a significant toxic air quality impact.**

See discussion under Impact 4.1-4.

Mitigation Measure

4.1-12 *See Mitigation Measure 4.1-4. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.1-13 **Implementation of TCM 13 would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a significant air quality impact.**

See discussion under Impact 4.1-5.

Mitigation Measure

4.1-13 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

<u>Impacts from Indirect Source Review Measures</u>

<u>Impact</u>

4.1-14 **Implementation of TCM 16 would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust, a suspected carcinogen. These control measures might have a significant toxic air quality impact.**

See discussion under Impact 4.1-4.

<u>Mitigation Measure</u>

4.1-14 *See Mitigation Measure 4.1-4. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

<u>Impact</u>

4.1-15 **Implementation of TCM 16 would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a significant air quality impact.**

See discussion under Impact 4.1-5.

<u>Mitigation Measure</u>

4.1-15 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

<u>Impacts from Implementation Support Measures</u>

<u>Impact</u>

4.1-16 **Implementation of TCMs 17, 18, 19 and 21 would result in the increased use of diesel buses causing an increase in the emission of diesel exhaust, a suspected carcinogen. These control measures might have a significant toxic air quality impact.**

See discussion under Impact 4.1-4.

Mitigation Measure

4.1-16 *See Mitigation Measure 4.1-4. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.1-17 **Implementation of TCMs 17, 18, 19 and 21 would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a significant air quality impact.**

Mitigation Measure

4.1-17 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impacts Related to Mobile Source Control Measures

Impact

4.1-18 **Implementation of control measure G3 and Contingency Measure G4 would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a significant air quality impact.**

See discussion under Impact 4.1-5.

Mitigation Measure

4.1-18 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.1-19 **Implementation of control measure H3 would promote the use of clean fuel vehicles; which would increase emissions of formaldehyde. Formaldehyde is a suspected carcinogen, and thus its emissions could result in a significant adverse air quality impact.**

See discussion under Impact 4.1-5.

Mitigation Measure

4.1-19 *See Mitigation Measure 4.1-7. This impact would remain significant and unavoidable with the implementation of this Mitigation Measure.*

Impact

4.1-20 **Implementation of control measure H3 could increase fugitive emissions of methane, a greenhouse gas. This would be a significant impact.**

See discussion under Impact 4.1-8.

Mitigation Measure

4.1-20 *See Mitigation Measure 4.1-8. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impacts from Market-Based Transportation Measures

Impact

4.1-21 **Implementation of market-based control measures would result in an increase in vehicles accessing transit facilities, causing an increase in localized emissions of carbon monoxide emissions at nearby intersections. These control measures could have a significant air quality impact.**

See discussion under Impact 4.1-5.

Mitigation Measure

4.1-21 *See Mitigation Measure 4.1-5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Stationary Source Control Measures

Overview of Stationary Source Control Measure Impacts on Air Quality

Impact

4.1-22 **Implementation of the stationary source control measures would result in a beneficial effect on air quality through a net reduction in emissions of reactive hydrocarbons and oxides of nitrogen from stationary sources.**

Implementation of the stationary source control measures outlined in the CAP would have a net beneficial air quality effect. Emission reductions for each of the eight groups of stationary source control measures are presented in Table 4.1-6. Emission reductions from each stationary source by category are presented in Appendix D.

Stationary sources have been grouped into eight categories:

A	Surface Coating and Solvent Use
B	Fuels/Organic Liquids from Railcar Loading
C	Refinery and Chemical Plant Processes
D	Combustion of Fuels (NO_x) Sources
E	Other Industrial/Commercial Processes
F	Other Stationary Source Control Measures
G	Intermittent Transportation Control Measures
H	Motor Vehicles

In addition to reduced emissions of the ozone precursors and NO_x, some stationary source control measures would reduce odorous emissions and emissions of benzene, an odorous and toxic air contaminant. Because many VOCs are odorous, control measures reducing the emissions of VOCs would in many cases also reduce odors. Lowering the VOC limits on coatings and the use of abatement devices are among a few of the control measures which reduce the exposure of individuals to odorous compounds. Some stationary source control measure categories, Fuels/Organic Liquids and Distribution Control Measures (Group B) and Refinery and Chemical Processes Control Measures (Group C), would reduce exposure to odorous Componds which are also toxic air contaminants.
required.

TABLE 4.1-6
ESTIMATED AVERAGE EMISSION REDUCTIONS
FROM THE 1991 CLEAN AIR PLAN
STATIONARY SOURCE CONTROL MEASURES
(Tons/Day)

Group Description	1992	1993	1994	1995	1996	1997	1998	1999	2000
Reactive Organic Gases									
A Surface Coating and Solvent Use	1.58	1.82	6.00	8.93	16.42	21.91	22.61	23.41	23.69
B Fuels/Organic Liquids Storage and Distribution	--	0.20	0.63	0.71	0.94	2.37	2.48	2.51	2.53
C Refinery and Chemical Processes	--	--	0.57	4.55	6.40	6.46	9.51	9.59	9.67
E Other Industrial/Commercial Processes	--	--	1.26	1.29	1.33	1.37	1.41	1.45	1.50
F Other Stationary Sources	--	--	--	--	--	--	--	--	--
G Intermittent Transportation (G1 and G2)	10.72	14.49	14.55	14.67	14.85	14.96	15.07	15.24	15.35
Total	12.30	16.51	23.01	30.14	39.94	47.06	51.07	52.19	52.74
% of Baseline Stationary Sources			8.52			16.69			18.06
% of Baseline Total Emissions			4.43			9.39			10.92
Oxides of Nitrogen									
D Combustion of Fuels (NO_x Sources)	--	--	--	--	7.66	68.34	69.26	70.26	71.24
G Intermittent Transportation (G1 and G2)	0.72	0.83	0.84	0.85	0.87	0.88	0.89	0.89	0.90
Total	0.72	0.83	0.84	0.85	8.53	69.22	70.15	71.15	72.14
% of Baseline Stationary Sources			0.51			38.67			38.58
% of Baseline Total Emissions			0.15			12.87			13.56

Note: Emission reductions from control measures A2 and A15 occur after the year 2000.
Emission reductions from control measures D7, E1 and F1 through F4 were not quantified by the BAAQMD and therefore are not represented in this table.

Source: 1991 Clean Air Plan, Candidate Control Measure Descriptions, BAAQMD, Draft March 18, 1991.

Mitigation Measure

4.1-22 *None recommended or required.*

Impacts from Surface Coating and Solvent Use Control Measures

Impact

4.1-23 **An increase in stratospheric ozone depleting substances, toxic air contaminants and substances contributing to global warming may occur for stationary source control measures A1 through 7, A9 through 11, A13 and A18, if non-precursor ("exempt") solvents are used to reformulate coatings. These control measures could have a significant air quality impact.**

Many of the Surface Coating and Solvent Use control measures would reduce the emissions of ROGs by lowering the VOC-limits on specified coatings. To meet these lower VOC-limits, manufacturers of these specialty coatings may attempt to reformulate the coatings using compounds which are non-precursors ("exempt") solvents. Some non-precursor solvents, or solvents that do not react in the formation of ozone, are chemically reactive with ozone. Aside from the ability of these compounds to deplete the stratospheric ozone, these compounds may contribute to global warming. Reformulation of coatings may also lead to the increased use of compounds identified as toxic air contaminants. Among the compounds of concern is methyl chloroform (1,1,1-trichloroethane), known to deplete ozone and contribute to global warming and suspected of being hazardous to human health.

There are alternatives to the use of "exempt" solvents in achieving coatings with lower VOC limits. Among the technologies that can be employed to produce coatings with low VOC emissions are reactive diluents, in which organic solvents chemically react to become part of the finished coating waterborne coatings, ultra-violet (UV) coatings and, powder coatings.

Mitigation Measure

4.1-23 *To reduce the air quality impact to a less than significant level for control measures lowering the VOC limits on specialty coatings, the BAAQMD would adopt regulations that would restrict the use of chemicals which are ozone depleting, contribute to the greenhouse effect or which would be toxic air contaminants in the reformulation of the coatings.*

Impact

4.1-24 **The increased use of incinerators to achieve regulatory standards for ROG (measures A9, 12, 13 and 16) would increase combustion emissions of NO_x and CO. These emissions would result in a less than significant air quality impact.**

Control measures which would depend on incineration as a control technology to reduce emissions of ROGs would result in exhaust emissions of criteria pollutants and other byproducts of incomplete combustion. While the combustion exhausts from incineration of ROGs would result in the emission of NO_x and CO, reductions in these air contaminants occurring from the implementation of the CAP (e.g., control measure F1, Improved New Source Review Rule) would more than compensate for these increases.

Mitigation Measure

4.1-24 *The BAAQMD permit process would limit the emissions of NO_x and CO from abatement devices that might utilize incineration for compliance.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.1-25 **The increased use of incinerators to achieve regulatory standards for ROG (measures B1, B3, B5 and B7) would increase combustion emissions of NO_x and CO. These emissions would result in a less than significant air quality impact.**

See discussion under Impact 4.1-22.

Mitigation Measure

4.1-25 *See Mitigation Measure 4.1-22.*

Impacts from Refinery and Chemical Processes Control Measures

No adverse air quality impacts are associated with this category of stationary source control measures.

Impacts from Combustion of Fuels (NO_x Sources) Control Measures

Impact

4.1-26 **Control measures to reduce emissions of NO_x (measures D1 through D5) may utilize ammonia, a hazardous material, to reduce emissions of NO_x. An increase in emissions of ammonia could result in significant air quality impact.**

Add-on controls, such as nonselective catalytic reduction (NSCR) and selective catalytic reduction (SCR) may be used to achieve NO_x standards for boilers and internal combustion engines. The SCR and NSCR technologies inject ammonia, a toxic gas, into the combustion flue gas; the ammonia reacts with the NO_x to form nitrogen gas (N_2) and water vapor. Excess ammonia, or ammonia that fails to react with the NO_x, "slips" through the control device and is released into the atmosphere. Typically, ammonia slip results in emissions of ammonia of approximately 5 to 10 ppm[18]. Ammonia releases from the use of NSCR and SCR controls usually would not affect ground level concentrations, because the ammonia would be suspended in the hot flue gas which would cause it to rise as it leaves the stack. In addition, ammonia is less dense than air and, therefore, it would tend to rise in the atmosphere due to buoyancy.

For a discussion public health and safety issues arising from the accidental release of ammonia, refer to Section 4.5.

Mitigation Measure

4.1-26 *The BAAQMD would adopt regulations limiting the emission of ammonia for add-on controls using ammonia to control NO_x emission standards. Monitors and controllers in the flue gas system that optimize ammonia to minimize ammonia slip would reduce this air quality impact to less than significant.*[19]

Impacts from Other Industries/Commercial Processes Control Measures

No adverse air quality impacts are associated with this category of stationary source control measures.

Impacts from Other Stationary Source Control Measures

No adverse air quality impacts are associated with this category of stationary source control measures.

Impacts from Intermittent Control Measures

No adverse air quality impacts are associated with this category of stationary source control measures.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative air quality impacts can arise from those activities which would occur within the Bay Area as well as activities occurring in adjacent counties and air districts. Because the CAP is a regional plan, it has accounted for all activities within the region that would have a related air quality impact. Among the activities occurring within the Bay Area that would have a cumulative air quality affect are population, employment, housing, transportation, and commercial, industrial and agricultural development. In the preparation of the CAP, growth projections for population and transportation were prepared by ABAG and MTC, respectively, to determine the baseline emissions. These baseline emissions, presented in Table 4.1-2, show the cumulative air quality impacts without the CAP. Provided growth in the Bay Area and emission factors related to that growth are consistent with those used in the preparation of the CAP, emissions presented in the baseline would not be exceeded. Cumulative air quality impacts after implementation of the CAP are presented in Table 4.1-4.

Cumulative air quality impacts from factors outside the Bay Area would be associated with the transport of air pollutants from other neighboring air basins. A discussion of air basins which either transport pollutants to the Bay Area or are receptors of air pollutants generated in the Bay Area is presented in Section 4.1.1, Setting. As stated in the CCAA:

> "The plans for districts responsible for or affected by air pollutant transport shall provide for attainment and maintenance of the state and federal standards in both the upwind and downwind district."

The link created by this clause requires adjacent air districts to implement plans to reduce emissions in an effort to attain State and federal air quality standards. In the Bay Area, this mandate is

embodied in the CAP, which not only reduces ambient concentrations of air pollutants in the Bay Area, but also reduces the amount of air pollutants transported to adjacent air districts. Similarly, air quality plans being prepared by adjacent air districts would result in a reduction in air pollutant emissions being transported to the Bay Area. For this reason the Bay Area should have a cumulative air quality benefit from air quality plans implemented in response to the CCAA.

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1. Bay Area Air Quality Management District, Air Quality Handbook 1989-1990, pg. 21.

2. Authority cited: Section 39601, Health and Safety Code. Reference: Sections 39001 and 39606 (a), Health and Safety Code.

3. These policies are codified in BAAQMD Regulations 2, Rules 2-1-301 and 2-1-302, which state that new sources of toxic air contaminants are not exempt from obtaining an Authority to Construct and Permit to Operate if they emit air toxics in a quantity determined to be appropriate for review by the Air Pollution Control Officer.

The BAAQMD Air Toxics Risk Screening Policy (1989) lists contaminants and contaminant sources which trigger a Risk Screening Analysis. Projects which qualify for review under these criteria and are deemed insignificant require no further toxics review; projects deemed significant must provide a Formal Risk Assessment unless the project sponsor: 1) modifies the project to reduce the health risks to levels that are below the significance criteria; or 2) prepares a Refined Screening Analysis showing that risks are below the significant criteria.

4. California Air Resources Board, Proposed Toxic Air Contaminant Identification List, December 1990.

5. An inversion is a condition under which warm air aloft limits upward movement of pollutants contained in a colder layer of air near the surface.

6. Metropolitan Transportation Commission, Regional Transportation Plan for the San Francisco Bay Area DEIR, April 1991, p. 5.17.

7. Bay Area Air Quality Management District, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, Revised April 1988, p. VIII-1 through VIII-3.

8. BAAQMD, Risk Management Policy, May 11, 1989.

9. Ibid.

10. DeMandel, Robin. Bay Area '91 CAP Technical Memo No. 28, "Current and Projected Population Exposure to Ozone in the San Francisco Bay Area -- A Preliminary Assessment," July 1991.

11. Ventura County Air Pollution Control District, Ventura County Air Quality Management Plan DEIR, April 1991, p. 5-3.

12. BAAQMD, Air Quality and Urban Development, November 1985, Table VI-C-2, p. VI-18.

13. Ventura County Air Pollution Control District, Op. cit., p. 5-5.

14. BAAQMD, Air Currents, April 1991.

15. Ibid.

16. California Energy Commission, Global Climate Change: Potential Impacts and Policy Recommendations, Draft, March 1991, p. 1-4.

17. Ibid.

18. Ventura County Air Pollution Control District, Op. cit., pp. 5-3.

19. Ventura County Air Pollution Control District, Op. cit. p. 5-6.

4.2 TRANSPORTATION

This section describes the transportation setting, impacts, and mitigation measures for the 1991 Clean Air Plan.

SETTING

This section describes the existing regulatory conditions related to the proposed 1991 Clean Air Plan transportation control measures (TCMs) and existing regional travel patterns.

The Bay Area Air Quality Management District (BAAQMD) cannot directly implement most of the TCMs contained in the 1991 Clean Air Plan (CAP). The cities, counties, transit districts, and the State transportation department (Caltrans) are the agencies responsible for planning, funding, constructing, and operating the transportation facilities in the San Francisco Bay Area. The BAAQMD influences the decisions of these agencies through air quality plans prepared by the BAAQMD with the technical assistance of the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG). The relevant air quality plans are the 1982 Bay Area Air Quality Plan (AQP) and the 1991 Clean Air Plan (CAP). Federal legislation requires that the transportation facility capital improvement programs developed by MTC and the county congestion management agencies conform with the TCMs contained in the AQP.

Agencies Responsible for Implementation of TCMs

The BAAQMD covers nine counties in the San Francisco Bay Area: San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Napa, Marin, and portions of Solano and Sonoma counties. These counties, the incorporated cities within these counties, and District 04 of the California State Department of Transportation (Caltrans) are the primary agencies responsible for planning, funding, designing, constructing, operating, and maintaining new and existing streets and highways in the BAAQMD region. These are the agencies that would be responsible for implementing the various TCMs contained in the CAP. MTC is responsible for regional transportation planning and general oversight of the efforts of local agencies.

A special service district has been established to maintain and operate the Golden Gate bridge and to operate public transit service across this bridge: the Golden Gate Bridge, Highway &

Transportation District (Golden Gate). This district operates inter-county bus and ferry public transit services between Sonoma, Marin and San Francisco Counties.

A few cities and counties also fund and operate public transit services. These include the City and County of San Francisco (MUNI), the City of Fairfield and Suisun City (Fairfield Transit), the City of Napa (Napa Transit), the City of Santa Rosa (CityBus), Sonoma County (Sonoma County Transit), the City of Vallejo (Vallejo Transit), and Marin County (Marin Transit).

In addition, various special service districts have been established to plan, fund, design, construct, and operate public transit services in the BAAQMD area. These districts include: the Alameda Contra Costa Transit District (AC Transit), the San Francisco Bay Area Rapid Transit District (BART), the Central Contra Costa Transit Authority (CCCTA), the Livermore Amador Valley Transit Authority (LAVTA), the San Mateo County Transit District (SamTrans), the Santa Clara County Transit District (SCCTD), the West Contra Costa Area Transit District (WestCat), and the Delta Transit District (Tri-Delta).

Caltrans is currently responsible for operating the CalTrain service between San Jose and San Francisco in cooperation with the transit districts of San Mateo and Santa Clara County (SamTrans and SCCTA).

The California State Legislature established the Metropolitan Transportation Commission (MTC) in 1970 to review transportation projects requesting federal and State grants, and to establish regional priorities for the allocation of federal and State transportation grants. MTC is composed of appointed representatives from each of the nine counties, the cities, the Association of Bay Area Governments (ABAG), and the San Francisco Bay Conservation and Development Commission (BCDC). Additional non-voting members include the State Secretary for Business and Transportation, the State Department of Housing and Urban Development, and the United States Department of Transportation.

Regulatory Framework for Implementation of TCMs

State and federal grants currently account for approximately one-fifth of the total expenditures on transportation improvements and operations in the BAAQMD region.[1] The State and federal

governments require that local agencies comply with certain federal and State regulations as a condition for receiving these grants. The State and federal legislation most relevant to the CAP include the following:

1. The 1977 Federal Clean Air Act and 1990 Amendments;
2. The California Congestion Management Program; and
3. The 1988 California Clean Air Act.

The 1977 Federal Clean Air Act and 1990 Amendments

The 1977 Federal Clean Air Act (FCAA) and 1990 Amendments, (42 United States Code, section 7410, et seq.) requires that MTC approve federal funding for only those transportation plans, projects, and programs that conform to the State implementation plan (SIP) for the BAAQMD region.[2]

The BAAQMD SIP is currently the 1982 Bay Area Air Quality Plan. The current 1982 SIP has 12 TCMs listed in Appendix "B" of the 1982 SIP. MTC adopted a contingency plan in February 1990 containing an additional 16 TCMs. These TCMs (which are currently being implemented by MTC) are listed in Tables 4.2-1 and 4.2-2. Current carbon monoxide control strategies are listed in Table 4.2-3.

MTC annually prepares a five-year Transportation Improvement Program (TIP) that includes all transportation projects that are projected to be funded with State and/or federal funds. As part of the annual update of the TIP, MTC must prepare an assessment of the TIP's conformity to the SIP and the progress to date on implementing the TCMs contained in the SIP.

Similarly, MTC updates its 20 year Regional Transportation Plan (RTP) every two years. TIP projects must be included in the RTP. MTC must also prepare an assessment of the RTP's conformity to the SIP.

TABLE 4.2-1

1982 BAY AREA AIR QUALITY PLAN TRANSPORTATION CONTROL MEASURES

FTCM 1. Reaffirm Commitment to 28 percent Transit Ridership Increase Between 1978 and 1983.

Annual ridership actually increased by 32 percent during this period, exceeding the TCM target.

FTCM 2. Support Implementation of Transit Operator's Five Year Plans, and Increase Transit Ridership by 15 percent between 1983 and 1987.

Annual ridership actually decreased by 11 percent during this period, thus failing to meet the target.

FTCM 3. Seek to Expand Public Transit Beyond Committed Levels.

The goal was to increase public transit fleets by 15 percent between 1982 and 1987. An increase of 11 percent was actually achieved during this period.

FTCM 4. Promote High Occupancy Vehicle (HOV) Lanes and Ramp Metering.

HOV lanes and/or ramp metering have been implemented in Alameda, Contra Costa, Marin, San Francisco, and Santa Clara Counties.

FTCM 5. Support RIDES Efforts.

Rides for Bay Area Commuters (RIDES) is a non-profit corporation funded by Caltrans and MTC. RIDES provides carpool matching services, rideshare information services, vanpool formation and support services, supports local agency transportation system management (TSM) programs, and assists major employers in training TSM coordinators and developing TSM programs.

FTCM 6. Continue Efforts to Obtain Funding for Long Range Transit Improvements.

Proposed long range transit improvements include: BART Extensions, the Guadalupe Light Rail System, and The MUNI Metro Turnaround Facility.

FTCM 7. Preferential Parking

Includes construction of park and ride lots for carpools, vanpools and transit riders. Sixty-three lots owned and operated by Caltrans were proposed, of which all but seven have

Table 4.2-1 (Continued)

either been completed or are currently under construction. Also includes construction and/or expansion of parking lots at Guadalupe Corridor Light Rail stations, BART stations, and CalTrain stations.

FTCM 8. Shared Use Park & Ride Lots

Includes leasing of excess parking spaces from private land owners (churches, shopping centers, etc.) for use as park and ride facilities. Thirty-nine joint use lots are currently being operated by Caltrans.

FTCM 9. Expand Commute Alternatives

Consists of an MTC/RIDES program to train TSM coordinators at major employers.

FTCM 10. Provide Information to Local Governments

Consists of providing various guides, brochures, and reports on TSM and traffic mitigation to local agencies.

FTCM 11. Gasoline Conservation Awareness Program

This was a State Energy Commission program to train large vehicle fleet operators on techniques for saving fuel. This program has been discontinued.

FTCM 12. Santa Clara County Commuter Transportation Program

This is a multi-faceted program being implemented by Santa Clara County Transit District which consists of: a ridesharing program, express bus service, park and ride lots, HOV lanes, and improved CalTrain service.

Note: FTCM = Federal Transportation Control Measure.

Source: "Air Quality Conformity Assessment", 1990-94 Transportation Improvement Program, Volume II, Section 10, Metropolitan Transportation Commission, April 24, 1991.

TABLE 4.2-2
1990 MTC CONTINGENCY PLAN OF THE
1982 BAY AREA AIR QUALITY PLAN
TRANSPORTATION CONTROL MEASURES

FTCM 13. Increase Bridge Tolls to $1.00 on All Bridges

State Senate Bill 45 (Statutes 1988) raised the tolls on all San Francisco Bay bridges to $1.00 and allowed MTC to allocate up to 3 percent of the increased toll revenues to projects that reduce bridge traffic congestion. Not less than 90 percent of the increase in the San Francisco-Oakland Bay Bridge toll must be used for rail transit capital improvements to reduce traffic congestion on that bridge.

FTCM 14. A Bay Bridge Surcharge of $1.00.

This measure would raise the toll on the San Francisco-Oakland Bay Bridge to $2.00 and allocate the new revenues to: improved BART feeder bus service, BART fare discounts, new ferry service in the Bay Bridge Corridor, an automated toll collection system on the bridge, and an expanded traffic operation system (TOS) on the approaches to the bridge.

FTCM 15. Increase State Gas Tax by 9 Cents

This measure was approved by voters (Senate Constitutional Amendment 1) in June 1990. The increase is graduated over 4 years. Currently 6 cents of the total 9 cent increase has been implemented as of this writing. Increased funds are being used to fund State highway improvements, local street construction, traffic operations improvements, and mass transit facility construction.

FTCM 16. Implement MTC Resolution 1876 - New Rail Starts

This resolution documents the inter-agency agreement to fund and construct the BART Colma extension.

FTCM 17. Continue Post-Earthquake Transit Services

This measure consists of maintaining the Vallejo and Oakland/Alameda ferry services to San Francisco, one extra hour of commute service on the Daly City-Richmond BART line, and earlier start of service times for BART on weekdays and Sundays.

FTCM 18. Sacramento-Bay Area AMTRAK Service

This measure would implement three round trips a day AMTRAK service between San Jose, Oakland and Sacramento.

FTCM 19. Upgrade CalTrain Service

This measure would extend CalTrain service to Gilroy, increase the number of daily trains from 52 to 66 by 1993, and purchase the CalTrain right of way from Southern Pacific Railroad.

FTCM 20. Regional HOV System Plan

Seventy-seven lane-miles of HOV lanes existed in January 1989. MTC's 2005 HOV Lane Master Plan would add 412 lane-miles of HOV lanes. Between January 1989 and March 1991, 29 lane-miles of HOV lanes were constructed.

FTCM 21. Regional Transit Coordination

Includes regulations set by MTC for coordination of fares, public information, marketing, schedules, service, and administration among the regional transit operators.

FTCM 22. Expand Regional Transit Connection Ticket Distribution

MTC funds RTC (Regional Transit Connection) which is composed of employers that sell a minimum of $600 a month in transit tickets and passes. MTC would seek to recruit more RTC members, and encourage more members to subsidize employee transit passes.

FTCM 23. Employer Audits

This measure consists of the identification of approximately 20 companies in the region that can serve as "pacesetters" for commuter alternatives trip reduction demonstration programs.

FTCM 24. Expand Signal Timing Program to New Cities

MTC would encourage and assist cities in applying for FETSIM (Fuel Efficient Traffic Signal Management) program signal timing funds.

FTCM 25. Maintain Existing Signal Timing Programs

MTC would assist local jurisdictions in identifying and obtaining federal and State funding for signal equipment upgrades.

FTCM 26. Incident Management on Freeways

Includes the implementation of the expanded Caltrans traffic operations system (TOS) to improve incident detection and management on the approaches to the San Francisco-Oakland Bay Bridge.

FTCM 27. Update MTC Guidance on Local TSM Programs

Includes preparation and distribution of new studies and reports designed to improve the technical understanding of what works and doesn't work in local TSM programs.

FTCM 28. Local TSM Initiatives

Includes preparation of model trip reduction ordinance by MTC for use by local jurisdictions that are currently considering adopting local TSM trip reduction ordinances.

Source: "Air Quality Conformity Assessment", 1990-94 Transportation Improvement Program, Volume II, Section 10, Metropolitan Transportation Commission, April 24, 1991.

TABLE 4.2-3
1982 BAY AREA AIR QUALITY PLAN
CARBON MONOXIDE CONTROL STRATEGIES

CITY OF SAN JOSE

Measures Recommended For Implementation:
1. Motor Vehicle Inspection and Maintenance
2. Commute Transportation Program
3. Advisory Review
4. Conformity Assessment

Contingency Measures:
5. Guadalupe Light Rail System
6. More Stringent CO Exhaust Emission Standards
7. Master Downtown Synchronized Traffic Signal Control System
8. Downtown TSM Plan and Parking Policies

CITY OF OAKLAND

Measures Recommended For Implementation:
1. Comprehensive Transportation Plan for CBD
2. Advisory Review
3. Conformity Assessment

Contingency Measures:
4. More Stringent CO Exhaust Emission Standards
5. Additional Measures Pending CBD Plan Results

Source: "Air Quality Conformity Assessment", 1990-94 Transportation Improvement Program, Volume II, Section 10, Metropolitan Transportation Commission, April 24, 1991.

The process by which MTC determines the conformance of its TIP and RTP to the SIP were recently challenged in U.S. District Court (Sierra Club vs. MTC). Judge Henderson ruled that "MTC must modify the manner in which it determines how the TIP and RTP 'conform' with the air quality objectives set forth in the 1982 Bay Area Air Quality Plan."[3] MTC's Resolution 2270 specifies the improved process for assessing TIP and RTP conformity with the SIP.

The 1990 federal Clean Air Act Amendments set new standards for emission reductions that will require revision of the 1982 SIP. The U.S. Environmental Protection Agency (EPA) is currently promulgating new conformity assessment regulations to implement the 1990 amendments. The region is currently in an interim period until these new regulations are published by EPA. MTC's Resolution 2270 procedures are designed to meet the requirements of Appendix "H" of the 1982 SIP and the 1990 Clean Air Act Amendments during this interim period.[4]

It is important to note that the CAP is not a SIP. The CAP is designed to meet the requirements of the California Clean Air Act, not the 1990 federal Clean Air Act Amendments. EPA is expected to release guidance for preparing attainments plans to meet the requirements of the 1990 Amendments in November 1991. Because the State ozone standard is more stringent than the federal standard, it is likely that the emission reduction strategies in the CAP will satisfy federal requirements. However, while the federal CAA requires conformity of the Regional Transportation Improvement Program (RTIP) and RTP to the SIP, the CCAA does not require the TIP and RTP to conform to the CAP.

Congestion Management Programs

The State of California requires urban counties to prepare Congestion Management Programs (CMP) (Chapter 2.6, Section 65088, of the California State Government Code) in order to receive the increase in gas taxes under Proposition 111.[5] All nine counties in the Bay Area must prepare CMPs.

Each county's CMP must be updated annually and must include every city and unincorporated area within the county. The CMP must be developed in consultation with the regional transportation planning agency (in the San Francisco Bay Region this agency is MTC), transit

providers, Caltrans, and the air quality management district (in the San Francisco Bay Region this agency is BAAQMD).

The CMP must be submitted to MTC for a finding of "consistency" with regional plans. MTC may elect to exclude inconsistent CMP projects from MTC's Regional Transportation Improvement Program. (A project must be in the RTIP to be eligible for State and/or federal funding).

The CMP must contain the following elements:

1. Level of service standards for State highways and principal arterial roads. These standards would be established by land use intensity and must not be lower than level of service (LOS) "E", or the existing LOS, whichever is lower.

2. Public transit routing, frequency, and coordination standards.

3. A Trip Reduction and Demand Reduction Element containing strategies to promote: ride-sharing, jobs/housing balance, flex-time, and parking management.

4. A program to analyze the impacts of local land use decisions on regional transportation facilities and an estimate of the costs of mitigation. The analysis shall use a "uniform transportation and traffic computer model and data base which shall be used throughout the region to determine the quantitative impacts of traffic generated by new development on regional transportation systems."

5. A seven-year capital improvement program that:
   a. Maintains and/or improves the traffic and transit levels of service,
   b. Mitigates the impacts of development, and
   c. Conforms to BAAQMD vehicle emissions air quality mitigation measures.

The county agency designated to develop the CMP must then annually monitor each city's and the county's conformance to:

1) the street and transit level of service standards;

2) adoption and implementation of a Trip Reduction Ordinance; and

3) adoption and implementation of a program to analyze the impacts of land use decisions and for estimating the cost of mitigation.

California State Government Code Section 65089 requires the preparation of "Deficiency Plans" for street segments and intersections failing to meet the level of service standards designated in the

CMP. These deficiency plans must:

1) analyze the causes of the deficiency;

2) list the improvements and their costs necessary to maintain a minimal level of service (LOS);

3) list the improvements (with costs) necessary to measurably improve LOS and air quality (these measures are preferably drawn from the air quality management district's approved list of TCMs, such as public transit, bicycle/pedestrian facilities, and HOV facilities); and

4) contain an action plan and schedule.

Inter-regional (through county) trips can be ignored in the level of service calculation. Trips originating in another county but terminating in the subject county can also be ignored. However, all trips originating in the subject county, regardless of their destination, must be included in the analysis. Jurisdictions can also ignore the impacts of construction, ramp metering, and signal coordination on level of service. Trips generated by low-income housing can also be ignored in the analysis.

Findings of "nonconformance" by the designated county agency may result in the State Controller withholding a city's or county's local share of the gas tax increase.

The CMP requirements are relevant to the CAP because of the overlap between the traffic congestion relief goals and programs of the CMPs and the Transportation Control Measures in the CAP.

The 1988 California Clean Air Act

The California Clean Air Act (Sections 40716, 40717, 40910-40920 of California State Health and Safety Code) requires each region in the State to develop and adopt a CAP by June 30, 1991, for achieving State air quality standards.[6] The State Air Resources Board has prepared the following list of what it considers to be "reasonably available" TCMs that must be included in the regional clean air plans:[7]

a. Employer-based trip reduction rules.

b. Trip reduction rules for other sources that attract vehicle trips.

c. Parking supply and pricing management.

d. Regional high-occupancy vehicle (HOV) plans and programs.

e. Comprehensive transit improvement programs.

f. Land development policies that support reductions in vehicle trips.

g. Development policies to strengthen on-site transit access for new and existing development.

Trends

As discussed in Section 4.4, ABAG has predicted that the total population in the Bay Region will increase by 27 percent between 1980 and the year 2010. The number of employed residents will increase by 50 percent and employment by 64 percent (see Table 4.2-4). A steadily increasing deficit between the number of workers living in the region and the number of available jobs is projected to start sometime after the year 1987.

Between 1980 and 2010, the increased population is projected to increase the number of daily person trips made in the region by 55 percent (see Figure 4.2-1). Trip generation is expected to increase faster than the population due to increased in-commuting by non-Bay Area residents and increased auto ownership by Bay Area residents. The increased auto ownership is due to a predicted 41 percent increase in per capita income in terms of constant 1979 dollars.

Average trip lengths are currently about 11 miles for home-to-work trips and between 4 and 6 miles for all other trip purposes. The average trip lengths (which increased between 1980 and 1987) are predicted by MTC to drop in 1997 and then gradually increase through the year 2010. However the increase by the year 2010 is expected to be less than the drop in trip lengths in 1997, so the average trip length between 1990 and 2010 is expected to drop by 9 percent.[8]

Total daily transit ridership is projected to increase from 1.1 million person trips in 1987 to 1.4 million person trips in the year 2000. The percent of total daily person trips using mass transit is projected to increase slightly from 6.7 percent in 1987 to 6.8 percent in the year 2000. The number of daily commuters driving alone to work is projected to increase from 2.9 million in 1987

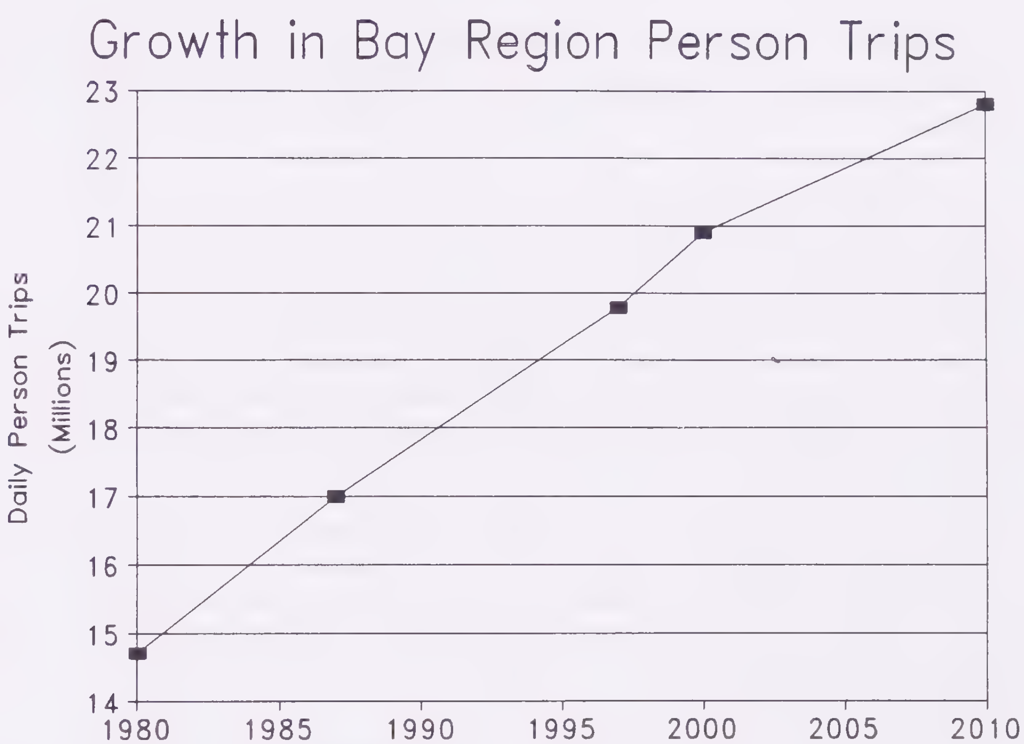
TABLE 4.2-4
PROJECTED REGIONAL POPULATION AND EMPLOYMENT

Year	Population	Employed Residents	Jobs
1980	5.2 million	2.6 million	2.5 million
1987	5.7 million	3.0 million	2.9 million
1997	6.3 million	3.5 million	3.6 million
2000	6.6 million	3.6 million	3.7 million
2010	7.0 million	3.9 million	4.1 million

Source: Bay Area Travel Forecasts, Congestion Management Program, Databook #1: Regional Summary, Metropolitan Transportation Commission, Tables A-3, A-4, A-5, pp. 57-58.

FIGURE 4.2-1

TRENDS IN REGIONAL TRIP GENERATION



Source: Dowling Associates.

to 3.6 million in 2000, but the proportion of commuters driving alone to work is projected to decrease from 71.4 percent in 1987 to 71.1 percent in the year 2000.[9]

The net result is that while total number of vehicle trips made in the region is expected to increase by 27 percent between 1990 and 2010, the total vehicle miles of travel (VMT) is expected to increase during the same period by only 18 percent (less than one percent per year).[10] Note that this 2010 VMT forecast includes all of the high-occupancy vehicle (HOV) lanes and bus/rail transit improvements that are also TCMs in the Clean Air Plan. Thus this forecasted 18 percent growth does not reflect the "no-project" condition, but includes implementation of portions of the Clean Air Plan.

IMPACTS AND MITIGATION MEASURES

This section describes the transportation impacts of the proposed TCMs in the CAP. This discussion is based upon materials provided by the Metropolitan Transportation Commission (MTC) and its analysis of the likely travel impacts of these measures. The following subsections describe the methodology used by MTC to evaluate the transportation impacts of the TCMs, MTC's estimated trip reductions for each measure, any negative transportation impacts associated with the TCMs, and recommended mitigation measures.

Methodology for Impact Analysis

The impacts of each TCM on total daily vehicle-miles traveled (VMT) and total daily vehicle-trips were estimated by MTC in terms of a percent reduction for each TCM. These percent reductions are compared to the alternative of taking no action on each particular TCM. This is not the same as comparing the reductions to the "no-project" alternative since some TCMs are also included in the "no-project" alternative. (See Table 6-3.)

The analytical methods used to estimate the percent reductions in VMT and vehicle-trips have presumed a forecast year of 1997. However, this does not mean that the TCMs can actually be fully implemented by 1997. The percent reductions shown here presume 100 percent implementation.

The assumptions for each TCM and the phase of the CAP when they are expected to be implemented are shown in Table 4.2-5. The total reduction for the sum total of all TCMs takes into account overlapping actions among the TCMs.

Analysis of the travel reduction effects of the TCMs includes estimated percentage reductions in daily vehicle-trips and daily vehicle-miles traveled (VMT). This analysis did not use MTC's computer travel model; consequently, no results are available on the peak hour or average daily traffic impacts of the proposed TCMs on specific highway and/or transit facilities in the region. Transit patronage estimates were not prepared by MTC for the TCMs. Thus, level of service impacts and transit vehicle fleet needs could not be determined for the TCMs.

For TCMs involving actual implementation of facilities or tolls directly affecting travel time and costs, it was possible to estimate travel behavior changes based upon factors (elasticities) taken from the MTC mode split model. These estimates were sometimes further refined to take into account possible spatial shifts (changes in job locations, housing locations), temporal shifts (spreading of the peak), and mode shifts (to transit and HOV's) that might occur due to changes in costs and time.

For other TCM measures where specific travel time and/or cost savings could not be determined (such as preparation of a model trip reduction ordinance, or addition of an air quality element to local General Plans), various experts in the transportation field were consulted and a consensus (or range) was determined as to the likely benefits of each measure.

This approach is, in many respects, beyond the state-of-the-art. The methodology used to analyze the TCMs is sensitive to issues and effects that are beyond the standard computerized travel models. The methodology was created and implemented by Dr. Greig Harvey of Deakin, Harvey, Skabardonis, a consultant to the BAAQMD and MTC.

No generally accepted technical approach exists for the analysis of the transportation impacts of many of the proposed TCMs. In these cases, estimates were based upon the collective judgment of experts in the field. The resulting estimates of trip reductions and VMT reductions for certain

TABLE 4.2-5
ASSUMPTIONS USED IN ANALYSIS OF
1991 CLEAN AIR PLAN
TRANSPORTATION CONTROL MEASURES[a,b,c]
(Numbers Denote Phase of CAP)

1. Employer Assistance Program

   a. Extend RIDES' large employer outreach program to approximately 1,000 employers of 100 or more persons (RIDES currently assists employers of 250 or more persons)(Phase 1).[d]

   b. Prepare guidebook for employers describing the potential Telecommuting options and estimating the potential emissions reduction potential of telecommuting (Phase 1).

   c. Monitor employee commute patterns through an annual employee survey (1).

   d. Help RIDES develop additional training for employer transportation coordinators (1).

2. Employer Trip Reduction Rule

   a. Develop model Trip Reduction Ordinance (TRO) for use by local agencies. Local agencies would be allowed to set their own specific goals (1).

   b. Promote adoption of the model TRO by those local agencies without an existing TRO (1).

   c. Adopt regional trip reduction rule. Employers of 50 or more employees would choose to either: 1) develop and implement trip reduction program to achieve 1.3 to 2.0 average vehicle ridership (number of employees reporting for work divided by number of cars used to get to work) depending on location; or 2) charge $3 per day for parking with monetary incentives for ride sharing and transit use (1).

3. Areawide Transit Improvements

   a. Continue BART post-earthquake expanded peak period service (1).

   b. Extend CalTrain service to Gilroy and increase number of trains from 52 to 66 per day (1).

   c. Assist local transit operators to develop comprehensive service plans that identify new markets, make greater use of timed transfers, improve interconnection, and map out service expansions (1).

   d. Implement portions of local transit operator comprehensive plans that are feasible within current funding constraints (1).

Table 4.2-5 (Continued)

e. Allocate funds obtained from new legislative authority for rail service expansion (2).

f. Allocate funds from new legislative authority to increase bus service by 33 percent (2).

g. Allocate funds obtained from market-based measures for rail service expansion (3).

h. Allocate funds obtained from market-based measures for rail service expansion (3).

4. <u>Regional Rail Agreement Expansion</u>

a. Construct BART extension from Daly City to Colma (1).

b. Accelerate funding and construction of the following rail extensions: BART from Colma to San Francisco Airport, BART from Concord to Pittsburg, BART from Bay Fair to Dublin, BART from Fremont to Warm Springs, CalTrain into Downtown San Francisco, Tasman Corridor Light Rail Line in Santa Clara. Requires securing $700 million in additional federal funding (2).

c. Allocate funds obtained from market-based measures for further rail transit expansion (3).

5. <u>Rail Access Improvements</u>

a. Assist transit operators in developing comprehensive rail and ferry access plans (1).

b. Implement feasible portions of access plans including parking lot expansions, shuttle services, and bus service adjustments (1).

c. Allocate funds obtained from new legislative authority for implementing remaining portions of access plans (2).

d. Allocate funds obtained from new legislative authority for assisting RIDES in working with major employers and employment centers to provide shuttles to rail stations (2).

e. Allocate funds obtained from market-based measures for access improvements (3).

6. <u>Intercity Rail Service Improvements</u>

a. Use $85 million in Proposition 116 funds to establish 3 round trips per day service by 1994 in Bay Area-Sacramento Corridor (six round trips by 1998) (1).

b. Obtain funds from new legislature authority to fund 10 round trips per day in Bay Area Sacramento Corridor (2).

Table 4.2-5 (Continued)

7. Ferry Service Improvements

   a. Continue post earthquake ferry service between Vallejo, Oakland, Alameda, and San Francisco (1).

   b. Develop regional ferry service plan (1).

   c. Allocate funds obtained from new legislative authority to fund implementation of regional ferry plan (2).

8. HOV Lanes on Freeways

   a. Implement the $500 million worth of HOV lanes that are currently fully funded in the Transportation Improvement Program (TIP) (approximately 220 lane-miles of the 400 additional lane miles that would be added by 2005 HOV Lane Master Plan) (1).

   b. Review and refine 2005 HOV Lane Master Plan (1).

   c. Allocate funds obtained from new legislative authority to accelerate implementation of the HOV lane projects determined to improve air quality (2).

9. Bicycle Access Improvements

   a. Require (through distribution of Article 3 TDA funds) that local agencies maintain up-to-date bicycle plans and bicycle advisory committees (1).

   b. Prepare Regional Bicycle Route Plan (1).

   c. Encourage transit operators to increase bicycle carrying capacity (1).

   d. Use $3 million of TDA Article 3 funds to implement portions of Regional Bike Plan (approximately 50 new miles of bike paths and 50 new miles of bike lanes) (1).

   e. Allocate funds obtained from new legislative authority to fund additional portions of Regional Bike Plan (2).

10. Youth Transportation

   a. Conduct study of youth transportation trends and emission contribution (1).

   b. Allocate funds obtained from new legislative authority to youth discount ticket subsidies (2).

   c. Allocate funds obtained from new legislative authority to school districts to operate buses (approximately double existing school bus services) (2).

Table 4.2-5 (Continued)

d. Allocate funds from new legislative authority to RIDES (and/or school districts) for development of high school student rideshare services (2).

e. Youth Transportation Improvement Program (3).

11. Freeway Traffic Operations System

a. Implement traffic surveillance system with dynamic signing and rapid response to incidents (Traffic Operations System - TOS) on San Francisco Bay Bridge and its approaches. Construct a regional traffic operations center (1).

b. Revise and Refine TOS Plan (1).

c. Develop Regional Automatic Vehicle Identification (AVI) Plan (1).

d. Develop Initial Advanced Highway Technology Plan (1).

e. Implement region-wide TOS system (covering approximately 216 miles of freeways) (2).

f. Allocate funds from new legislative authority to implement region-wide motorist traffic advisory system (2).

g. Allocate funds from new legislative authority to implement region-wide ramp metering system (2).

h. Seek legislation to fund automated toll collection system on the San Francisco Bay Bridge (2).

i. Allocate funds obtained from market-based measures to implement advanced highway technology (3).

12. Arterial Traffic Management

a. Maintain current local agency signal timing programs (1).

b. Develop Regional Arterial Operations Improvement Plan (1).

c. Obtain new funds from legislature to expand the FETSIM program so that signal optimization studies are conducted every 5 years for every eligible signal system (estimated to be approximately 60 percent of region's 6,000 traffic signals) (2).

d. Improve local arterials for bus service through Transit Signal Preemption Program (2).

e. Implement SMART Streets (2).

Table 4.2-5 (Continued)

13. <u>Reduced Transit Fares</u>

    a. Assist transit operators to establish better inter-service coordination and passenger discounts for inter-operator transfers (1).

    b. Promote employer distribution and subsidization of transit passes through Regional Transit Connections.

    c. Promote employer subsidization of transit passes (1).

    d. Conduct study of transit fare elasticities (1).

    e. Subsidize bus-rail transfers (2).

    f. Reduce fares for target groups (2).

    g. Fund establishment of retail outlet "transit stores" (2).

14. <u>Vanpool Liability Insurance</u>

    a. Conduct feasibility study of publicly supported vanpool liability insurance (1).

    b. Allocate funds obtained from new legislative authority for establishing regional vanpool insurance program (approximately 840 vanpools in the region) (2).

15. <u>Rideshare Incentives</u>

    a. Promote financial incentives for 3+ carpools (assumed $2.00 per day per employee) (1).

    b. Seek legislation authorizing free tolls on all bridges at all times for 3+ HOVs (high occupancy vehicles with 3 or more persons) (2).

16. <u>Indirect Source Control Program</u>

    a. Adopt an indirect source control program that will:
        1. require improved site design for transit, bicycle and pedestrian access;
        2. encourage mixed use development;
        3. encourage higher density development;
        4. encourage charging drivers for on-site parking;
        5. require improved traffic management for special events;
        6. provide an opportunity to review airport expansion plans; and
        7. provide an opportunity to assess capacity-increasing roads and highways.

Table 4.2-5 (Continued)

17. Public Education

    a. Develop and implement a public eduction program (1).
    b. Continue public eduction program (2).
    c. Continue public eduction program (3).

18. Higher-Density Zoning Near Transit

    a. Conduct a study of higher-density zoning near transit stations (1).

    b. Seek funding for local agencies to plan for higher density zoning next to new rail transit stations (2).

19. General Plan Air Quality Elements

    a. Encourage local agencies to include air quality element in General Plan as condition of delegation of BAAQMD "indirect source control" program responsibilities.

20. Demonstration Projects

    a. Seek sponsors for a telecommuting demonstration project (1).
    b. Seek sponsors for an alternative fuels demonstration project (1).
    c. Seek legislative authority to conduct an automated fee collection demonstration project (2).

21. Revenue Measures

    a. Continue current $1.00 bridge tolls (1).
    b. Continue currently approved gas tax increase of 9 cents per gallon (1).
    c. Seek legislative approval of:

        1. $2 bridge tolls;
        2. $4 vehicle registration fee; and
        3. a further $0.14 per gallon increase in gasoline tax.

22. Market-Based Measures

    a. Implement vehicle registration "smog" fee based upon number of miles driven and estimated pollutants emitted per mile of approximately 8 cents per mile driven. Fees would range from $20 to $1,000 per year (3).

    b. Implement regional automated freeway and arterial congestion pricing at levels necessary to maintain current 1990 congestion levels through the year 2010 (3).

    c. Establish regionwide parking charge of 60 cents per hour at non-work sites up to $3 per day maximum for non-residential lots. Use portion of proceeds for enforcement with the remainder going to transit improvements (3).

Table 4.2-5 (Continued)

d. Increase gasoline tax to $2.00 per gallon over a ten year period (3).

e. Require work site parking charges of $3.00/day.

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[a] "Summary of State TCM Plan Emissions Reductions: All Phases" (unpublished), by Deakin, Harvey, Skabardonis (DHS), April 1, 1991. "Detailed State TCM Plan Emissions Reductions" (unpublished), by DHS, April 2, 1991. "Definition of State Plan TCMs" (unpublished), by DHS, March 30, 1991.

[b] "Near-Term TCM Effects, Appendix: Summary of Emissions Reduction Estimates for Near-Term Transportation Control Measures"(unpublished), by Harvey/Deakin, Feb. 7, 1990.

[c] "Preliminary Cost-Effectiveness Calculations for TCMs (unpublished)", Metropolitan Transportation Commission, Nov. 1990.

[d] The phase in which each sub-measure is expected to be implemented is shown in parentheses following each submeasure's description.

TCMs are consequently subject to a comparatively large degree of uncertainty at this time. This uncertainty can only be reduced over time as more experience is built up as to the actual travel behavior effects of transportation control measures.

Introduction to Impacts Analysis

This section discusses the travel impacts of the TCMs proposed in the CAP. This discussion of impacts is based upon the composition of the TCMs, as described in Table 4.2-5.

This discussion of the specific impacts of the individual TCMs relies upon documentation prepared by consultants to BAAQMD and MTC.[11,12,13] Assumptions regarding details for each TCM were made in order to evaluate each TCM. It is important to note, however, that the specific details of many TCMs will be determined through a rule-making process, passage of State legislation, funding availability, and other processes affecting program development and implementation.

Standards of Significance

Four specific types of travel-related impacts are evaluated:

Travel Delay: Increases in travel time and/or delay to vehicle drivers, transit passengers, bicycle riders, and/or pedestrians associated with increased traffic congestion caused by increased demand or reduced capacity, and measures that increase the number of stops or reduce average travel speed such as: changes in vehicle mix, new toll collection locations, new stop signs, and ramp metering.

Travel Safety: Increases in accident hazards for vehicle drivers, transit passengers, bicycle riders, and/or pedestrians associated with simple increases in the number of persons and vehicles exposed to a given conflict situation or new situations that increase potential conflicts between vehicles, pedestrians, and bicycles.

Travel Discomfort: Potential increases in travel discomfort associated with overcrowding of passengers on transit vehicles.

Parking Overflow: Increases in parking demand likely to overflow lots and impact local streets.

The criteria for determining the significance of a particular travel-related impact must be necessarily general given the programmatic level at which the TCMs in the CAP have been specified. The general rule used here is that a 10 percent change from existing conditions at a particular location and time of day would be significant. However, precise data have not been generated to quantify

the effects of each TCM and determine if the approximate 10 percent rule has been exceeded. Rather, the evaluation has relied upon judgments as to the likely order of magnitude of each impact, and whether or not the magnitude of the impact is likely to exceed 10 percent.

Mobile Source Control Measures

Overview of Transportation Impacts and Mitigations

The CAP proposes 21 transportation control measures (TCMs), several Market-Based Measures, and six other measures (including three contingency measures) for reducing mobile source emissions. These 21 TCMs and the Market-Based Measures are divided into three phases:

Phase 1 - Reasonably Available Transportation Control Measures (TCMs) that can be implemented using existing authority and funding.

Phase 2 - Additional measures that require new legislation and/or new funding.

Phase 3 - Market-Based TCMs, which also require new authorizing legislation.

The time frame for the implementation of the TCMs assumed in the CAP is that Phase 1 measures would be adopted by 1994, Phase 2 by 1997, and Phase 3 after 1997.

The CAP TCMs incorporate and expand upon the Contingency Plan TCMs adopted by MTC in 1990 (employer-based trip reduction programs, transit and HOV improvements, freeway operation improvements, improved arterial operations, etc.; see Table 4.2-6).

The Phase 1 TCMs are expected to achieve approximately a six percent reduction in total daily vehicle-miles traveled in the region (see Table 4.2-7).[14] Phase 2 measures are projected to achieve another four percent reduction in vehicle miles traveled in addition to the reductions obtained in Phase 1 (see Table 4.2-8).[15] Phase 2 TCMs consist of further expansions in regional transit capacity and improvements in traffic operations on freeways, State highways, and local streets. The transportation impact of Phase 2 TCMs consequently consists of improvements in mobility and reductions in delays due to traffic congestion.

TABLE 4.2-6

MTC 1990 CONTINGENCY PLAN TCMS
INCORPORATED INTO 1991 CLEAN AIR PLAN TCMS[1]

1990 MTC Contingency Plan Transportation Control Measures		1991 Clean Air Plan Transportation Control Measures[2]
FTCM 13	Bridge tolls to $1 on all bridges	21a
14	Bay Bridge surcharge of $1	21c
15	Increase gas tax by $0.09 to $0.18/gal.	21b
16	New rail starts	4a
17a	Post-quake ferry service	7a
17b	Post-quake BART service	3a
18	AMTRAK service Sacramento-Bay Area	6a
19	Upgrade CalTrain service	3b
20	Regional HOV System Plan	8a
21	Regional Transit Coordination	13a
22	Regional Transit Ticket Distribution	13b
23	Employer Audits	1a
24	Expand Arterial Signal Timing	12c
25	Maintain Existing Signal Timing	12a
26	Incident Management on Freeways	11a
27	Update TSM Guidance	2a
28	Local TSM Initiatives	2b

[1] This table indicate how MTC Contingency Plan "federal" TCMs are incorporated within the 1991 Clean Air Plan TCMs. The TCMs in the CAP go beyond the FTCMs to include many additional measures. See Table 4.2-5 for the complete set of assumptions used to analyze the CAP TCMs.
[2] This column refers to the TCM submeasures described in Table 4.2-5.

TABLE 4.2-7

PROJECTED PHASE 1 TRANSPORTATION CONTROL MEASURE TRAVEL REDUCTIONS

TCM Description		Percentage Change In: VMT	Trips
Phase 1			
1	Employer Assistance Programs	.2	.14
2	Employer-Based Trip Reduction Rule	3.27	4.06
3	Improve Areawide Transit Service	.48	.43
4	Expand New Rail Starts	.07	.05
5	Improve Access to Rail Systems	.02	.03
6	Improve Intercity Rail Service	.05	.04
7	Improve Ferry Service	.015	.01
8	Construct Carpool/Express Buslanes on Freeways	.23	.22
9	Improve Bicycle Access	.01	.01
10	Youth Transportation	0.0	0.0
11	Install Freeway Traffic Operations (TOS)	-.02	-.01
12	Improve Arterial Traffic Management	-.01	-.01
13	Reduce Transit Fares	.11	.11
14	Vanpool Liability Insurance	0.0	0.0
15	Provide Carpool Incentives	0.0	0.0
16	Adopt Indirect Source Control Program	0.7	0.7
17	Conduct Public Education	0.0	0.0
18	Zoning Plans for Higher Densities Near Transit Stations	0.0	0.0
19	Air Quality Elements for General Plans	0.0	0.0
20	Conduct Demonstration Projects	0.0	0.0
21	Implement Revenue Measures	.62	.55
TOTAL		5.64	6.22

Note: Negative entries represent an increase in travel, and zeros indicate no travel effects in this phase.

TABLE 4.2-8

PROJECTED PHASES 2 AND 3 TRANSPORTATION CONTROL MEASURE TRAVEL REDUCTIONS

M Description		Percentage Reduction In: VMT	Trips
ase 2			
	Employer Assistance Programs	0.0	0.0
	Employer-Based Trip Reduction Rule	0.0	0.0
	Improve Areawide Transit Service	1.0	.9
4	Expand New Rail Starts	.7	.8
5	Improve Access to Rail Systems	.3	.25
6	Improve Intercity Rail Service	.04	.03
7	Improve Ferry Service	.03	.02
8	Construct Carpool/Express Buslanes on Freeways	.45	.35
9	Improve Bicycle Access	.02	.03
10	Youth Transportation	.11	.17
11	Install Freeway Traffic Operations (TOS)	.13	.09
12	Improve Arterial Traffic Management	.01	.02
13	Reduce Transit Fares	.17	.22
14	Vanpool Liability Insurance	.02	.01
15	Provide Carpool Incentives	.3	.2
16	Adopt Indirect Source Control Program	0.0	0.0
17	Conduct Public Education	0.0	0.0
18	Zoning Plans for Higher Densities Near Transit Stations	.05	.05
19	Air Quality Elements for General Plans	0.0	0.0
20	Conduct Demonstration Projects	0.0	0.0
21	Implement Revenue Measures	1.3	1.2
	Total	4.29	4.09
Phase 3			
22	Implement Market-Based Measures	13.72	14.6
	TOTAL	13.72	14.6

Note: Negative entries represent an increase in travel, and zeros indicate no travel effects in this phase.

Source: Greig Harvey, Deakin/Harvey/Skabardonis. June 12, 1991.

For related discussions of TCMs, readers may consult the Draft Regional Transportation Plan (RTP) for the Bay Area, the Draft EIR for the RTP, the 1991-1995 Transportation Improvement Program (TIP), and the conformity assessment of the 1990-1994 TIP.[16,17,18,19,20]

Phase 3 measures include vehicle registration "smog" fees of up to $1,000 per year, congestion-related tolls set high enough to preserve Level of Service "D" operations, a regional parking charge of 60 cents per hour per vehicle parked, and a gas tax increase to $2 per gallon. Work-site parking charges ($3/day) would be required. The additional revenue from these measures would be used to fund additional mass transit expansion. The Phase 3 measures are projected to achieve a 14 percent reduction in vehicle miles traveled in addition to the reductions obtained in Phases 1 and 2 (see Table 4.2-8).[21]

The travel reductions discussed above are major beneficial, regional effects of the CAP. The following significant adverse travel impacts would be generated by the TCMs contained in the 1991 CAP:

Impacts from Employer-Based Trip Reduction Measures

TCM 1. Employer Assistance Program

Impact

4.2-1 **TCM 1 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-1 *None recommended or required.*

This TCM would be implemented entirely in Phase 1. This measure by itself would have a relatively modest impact on regional travel patterns. This measure would only affect work-related commute trips which account for one-quarter of the daily trips in the region. The increased employer

assistance provided by RIDES would result in modest increases in ridesharing and transit usage. These increases would result in increased parking at transit stations and rideshare pick-up points. Increased transit demand would be mitigated by the transit improvements contained in TCMs 3 and 4. Increased parking demand at transit stations would be mitigated by TCM 5. Increased parking demand at rideshare pick-up points would be distributed throughout the San Francisco Bay region and consequently is not expected to increase significantly at any given location.

TCM 2. Employer Trip Reduction Rule.

Impact

4.2-2 **TCM 2 would result in potentially significant increases in parking overflows onto local streets and nearby parking lots.**

Mitigation Measures

4.2-2 *The BAAQMD would include in its proposed trip reduction rule the requirement that employers who set parking fees for employees must take the following steps:*

1) Notify the responsible local agency of intent to charge for parking so that local agency can take steps to reduce the overflow of employee parking demand onto local streets and public parking facilities.

2) Finance a parking impact study and mitigation program to be conducted by the responsible local agency. The mitigation program would include actions such as setting up residential parking permit program, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations, etc.

This impact would remain significant and unavoidable with the implementation of these mitigation measures.

This TCM would be implemented in Phase 1. MTC has developed a model Trip Reduction Ordinance for consideration by cities and counties, and many cities and counties have already passed trip reduction ordinances. Many major employers (hospitals, office parks, and universities) already have transportation demand management programs in place.

In addition, all cities and counties are already required to adopt a TRO in order to receive extra gas tax revenues as part of the congestion management plan process required by the State

legislature. Consequently, it is expected that most cities and counties will have adopted TROs regardless of the 1991 CAP. Few travel impacts are associated with the actions "a" and "b" of this TCM. (See Table 4.2-5.)

The major impact of this TCM results from the regional trip reduction rule as proposed in this TCM. (AVR goal between 1.3 and 2.0, parking fee optional, 50+ employees).

This trip reduction rule would have no impact on employers in downtown San Francisco, downtown Oakland, and downtown San Jose, where commuter AVRs and/or daily parking already exceed these minimums. This TCM would impact suburban employers where AVRs are low and parking is free.

Those employers who choose to charge a parking fee may need to reconstruct their parking lot entrances and exits to provide access control and to allow for the collection of the parking fees. If a parking fee is charged to employees, employees would begin to park in non-employer-operated lots and on public streets. Local residents and retail centers may be impacted by employee parking overflows into their lots and neighborhood streets.

The trip reduction rule might have to be expanded to cover all lots allowing all-day parking. Local agencies might have to install parking meters on nearby streets or they might establish "residential parking permit programs" in the vicinity of all employers affected by the trip reduction rule.[22]

Techniques (such as identifying monthly parking cards) would have to be developed in parking lots shared by more than one employer in order to distinguish between employees of companies meeting the AVR goal and employees of companies charging a parking fee instead.

This measure would only affect work-related commute trips, which account for less than one-quarter of the daily trips in the region.

The increased ridesharing and transit usage would result in increased parking at transit stations and rideshare pick-up points. Increased transit demand would be mitigated by the transit improvements contained in TCMs 3 and 4. Increased parking demand at transit stations would be mitigated by TCM 5.

Impacts from Mobility Improvements

TCM 3. Areawide Transit Improvements

Impact

4.2-3 **TCM 3 would result in potentially significant increases in parking overflows onto local streets in the vicinity of CalTrain stations.**

Mitigation Measure

4.2-3 *Caltrans and MTC would develop and implement Rail Access Plan for CalTrain as specified in TCM 5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-4 **TCM 3 would result in potentially significant increases in traffic on local streets and highways serving CalTrain stations.**

Mitigation Measure

4.2-4 *Transit providers would develop and implement traffic access and control plans for each transit station. Traffic access and control plans would include measures such as installation of additional traffic control devices (stop signs and traffic signals), installation of traffic diverters, improved guide signing, improved parking lot driveway design, improved pick-up/drop-off area design, street widenings, and the construction of new streets in the vicinity of transit stations, plus the transit access improvement measures contained in TCM 5. This impact would remain signficant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1, 2 and 3. The continuation of already-operating BART post-earthquake services should have no new impacts. Many BART station parking lots are filled to overflowing. Neighborhood streets in the vicinity of BART stations are impacted by overflow parking and traffic from BART patrons. Residential parking permit programs have been installed around most suburban BART stations to reduce the impacts of overflow parking demand.

Extending CalTrain service to Gilroy and increasing daily service would increase the number of riders parking in the vicinity of CalTrain stations. Neighborhoods in the vicinity of these stations

would be adversely impacted by parking overflows from the stations. Residential parking permits would reduce these impacts. These impacts would be mitigated with TCM 5, Rail Access Improvements, which would include parking lot expansions.

Implementation of the measure to obtain a 33 percent increase in transit funding so that transit service can be increased would significantly increase the number of buses operating on public streets. Buses use up more street capacity per vehicle but carry more persons per vehicle than the private automobile. Non-bus riders could experience modestly increased delays due to additional bus traffic, which would be more than compensated by the reduced number of private vehicles on the streets due to all of the TCMs proposed in the CAP. Bus congestion in some heavier transit corridors could increase enough to warrant exclusive bus lanes. The addition of bus lanes might require removal of a parking lane, conversion of an existing travel lane, or street widening to add a lane.

The impacts of further transit service expansions beyond those contemplated in Phase 2 would be similar to the impacts discussed above for increasing transit service funding by 33 percent, with the exception that they would be of a higher order of magnitude. This would be a less than significant effect.

<u>TCM 4. Regional Rail Agreement Expansion</u>

This TCM would be implemented at various levels in Phase 1, 2 and 3.

<u>Impact</u>

4.2-5 **TCM 4 would result in potentially significant increases in parking overflows onto local streets in the vicinity of BART, Guadalupe Light Rail, Tasman Light Rail, and CalTrain stations.**

<u>Mitigation Measure</u>

4.2-5(a) *Develop and implement Rail Access Plan for all rail operators as specified in TCM 5.*

4.2-5(b) *Preparation and implementation of parking control plans by developers, transit operations, cities and counties for areas surrounding transit stations.*

Impact

4.2-6 **TCM 4 would result in potentially significant increases in traffic on local streets and highways serving rail transit stations.**

Mitigation Measure

4.2-6 *Transit operators and MTC would develop and implement traffic access and control plans for each transit station. Traffic access and control plans would include measures such as: installation of additional traffic control devices (stop signs and traffic signals), installation of traffic diverters, improved guide signing, improved parking lot driveway design, improved pick-up/drop-off area design, street widenings, and the construction of new streets in the vicinity of transit stations, plus the transit access improvement measures contained in TCM 5.*

This TCM would be implemented at various levels in Phases 1, 2 and 3. This TCM would result in extension of rail transit service to several new stations and communities. The neighborhoods surrounding each station would experience increased traffic from rail transit riders parking at each station. Where the demand exceeds the parking lot capacities, there would be overflow parking in the neighborhoods. This impact could be reduced by imposing parking time limits, initiating residential parking permit programs, and/or installing parking meters. Since it is unclear at this time whether all parking needs would be met at every transit station, this impact may be unavoidable. Access plans under TCM 5 would attempt to mitigate this impact but may not render it less than significant.

The Phase 3 action of this TCM would have impacts similar to those described above for extended rail service. Since there are no plans for rail service extensions beyond those described for Phase 2, it is not clear exactly what would be implemented with Phase 3 funding. Phase 3 funding could be used primarily to complete those Phase 2 actions that could not be funded through regular channels.

TCM 5. Rail Access Improvements

Impact

4.2-7 **TCM 5 would result in potentially significant increases in traffic on local streets and highways serving rail transit stations.**

Mitigation Measure

4.2-7 *See Mitigation Measure 4.2-6. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1, 2 and 3. The Phase 1 plan preparation should have negligible travel impacts. The likely impacts of these access plans depend upon the results of these as yet unprepared plans. Presumably, these plans would include improvements in feeder transit service to the stations and station access design, as well as expansions of the parking lots at each station.

Parking lot expansions would allow localized increases in traffic at each transit station. Increased traffic at the stations would be compensated for by reductions in corridor level vehicle trips.

Construction of new parking lots would temporarily increase delays on local streets and temporarily add some additional construction-related vehicle trips.

An increase in the number of buses and shuttles serving each transit station would modestly increase delays to local traffic in the vicinity of these stations. The added bus traffic would be compensated for by the reduced number of vehicle-trips in the transit corridor. Bus congestion at some transit stations could increase possibly to levels where exclusive bus lanes might be warranted. Bus lanes might require removal of a parking lane, conversion of an existing travel lane, or street widening to add a lane.

The Phase 3 action would fund increased RIDES assistance to employers to provide employer-sponsored shuttles to rail stations. It could reduce VMT and trips.

The access improvement actions contained in this TCM would generally mitigate the parking impacts identified above for rail service expansions.

TCM 6. Intercity Rail Service Improvements

Impact

4.2-8 **TCM 6 would result in potentially significant increases in parking overflows onto local streets in the vicinity of Amtrak stations.**

Mitigation Measure

4.2-8 *Amtrak, Caltrans and MTC would develop and implement Rail Access Plan for Amtrak as specified in TCM 5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-9 **TCM 6 would result in potentially significant increases in traffic on local streets and highways serving Amtrak stations.**

Mitigation Measure

4.2-9 *MTC and Caltrans would develop and implement traffic access and control plans for each Amtrak station. Such plans would include measures specified in Mitigation 4.2-6. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1 and 2. The increased rail service would heighten traffic and parking demands in the vicinity of the AMTRAK rail stops. The localized parking impacts would be mitigated by TCM 5 in the CAP.

The Phase 2 actions of this TCM would further increase traffic and parking demand in the vicinity of the train stations. The parking impacts would be mitigated by Phases 2 and 3 of TCM 5 in the CAP.

TCM 7. Ferry Service Improvements

Impact

4.2-10 **TCM 7 would result in potentially significant increases in parking overflows onto local streets in the vicinity of ferry terminals.**

Mitigation Measure

4.2-10 *Develop and implement Ferry Access Plan as specified in TCM 5. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-11 **TCM 7 would result in potentially significant increases in traffic on local streets and highways serving ferry terminals.**

Mitigation Measure

4.2-11 *Ferry operators and MTC would develop and implement traffic access and control plans for each ferry terminal. These plans would include measures specified in Mitigation 4.2-6. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1 and 2. Continuation of post-earthquake ferry service should have no new impacts. Development of a regional ferry service plan is already underway.

The allocation of new funds to implement the as yet uncompleted regional ferry service plan would be a new action causing potential environmental impacts. Since the plan is not yet complete, the determination of likely impacts at this time is necessarily speculative. If the plan includes increased ferry service to new and existing sites, there would be increased parking and traffic demand in the vicinity of each ferry terminal. These localized impacts would be partially mitigated by TCM 5 of the CAP.

TCM 8. HOV Lanes on Freeways

Impact

4.2-12 **TCM 8 would result in potentially significant increases in parking overflows onto local streets in the vicinity of park-and-ride lots supporting the HOV lanes.**

Mitigation Measure

4.2-12 *Caltrans and responsible cities and counties would prepare parking impact studies and mitigation programs for each proposed park-and-ride lot. The mitigation programs would include actions such as setting up residential parking permit programs, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations, etc. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-13 **TCM 8 would result in potentially significant increases in traffic on local streets and highways serving park-and-ride lots supporting the HOV lanes.**

Mitigation Measure

4.2-13 *Caltrans would develop and implement traffic access and control plans for each park-and-ride lot. These plans would include measures similar to those discussed in Mitigation Measure 4.2-6. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-14 **TCM 8 would potentially result in an increase in traffic accidents where vehicles would enter and leave the HOV lanes. Implementation of this mitigation measure would reduce this impact to a less than significant level.**

Mitigation Measure

4.2-14 *Caltrans would develop and incorporate into updated regional HOV system plan recommendations for improved designs for HOV lanes that provide safer entry and exit locations for HOVs. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

This TCM would be implemented at various levels in Phases 1 and 2. Implementation of $500 million of HOV lanes is an action already programmed in MTC's RTIP.

The accelerated implementation of HOV lanes contemplated in Phase 2 would change the time frame in which the environmental impacts of implementing the HOV Plan are expected to occur but not the magnitude of these impacts.

Implementation of MTC's HOV System Plan would result in the following general travel impacts:

1. Reductions in congestion where HOV lanes are added to existing facilities. The HOV lanes would allow multioccupant vehicles and motorcycles to bypass traffic congestion during certain hours of each working day.

2. Increased parking and traffic demand at park-and-ride lots established to support the HOV facilities. The localized parking impacts would be mitigated by TCM 5 of the 1991 CAP where these lots are located at major transit stations.

Traffic would be increased in the vicinity of the park-and-ride lots. Total traffic in the HOV lane corridor would be reduced.

3. Potential for increased accidents at locations where HOVs must pull out of congested traffic streams into high speed HOV lanes, and at locations where HOV's must slow down and stop in the HOV lane in order to merge with congested traffic. This potential impact can be mitigated by improvements in the design of HOV facilities that limit the locations where vehicles are allowed to enter and leave the HOV lanes.

TCM 9. Bicycle Access Improvements

Impact

4.2-15 **TCM 9 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-15 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1 and 2. The travel impacts of this measure depend upon the contents of the forthcoming Regional Bicycle Route Plan. This plan would presumably contain bike paths and bike lanes that are already included in the circulation elements of local agency General Plans. Where the regional plan contained items not already in local plans, there would presumably be environmental impacts associated with this TCM that are not already included in the local General Plans.

This TCM does not require employees or developers to install support facilities for bicyclists (showers, lockers, etc.). Such measures would be part of the TDM programs prepared by employers in response to TCMs 1 and 2, and by developers in response to TCM 16.

A regional bike path not already included in a local plan would presumably generate the following general impacts:

1. Modest reduction in vehicular travel in corridor.

2. Potential increase in accidents where bike path crosses public highway. This effect is mitigated to insignificance by current designs that provide signing, signals, and other protection devices.

3. Increases in auto traffic to bike path staging areas, which would be compensated for by reductions in corridor vehicle travel. These traffic increases are not expected to be significant.

4. Increases in parking demand at bike path staging areas. These parking demand increases are not expected to be significant.

A regional bike lane not already included in a local plan would presumably generate the following general impacts:

1. Modest reduction in vehicular travel in corridor.

2. Potential increase in bicycle-related accidents. This effect is mitigated to insignificance by current designs that provide signing, signals, and other protection devices.

Recreational opportunities would be increased for those regional bike paths and lanes that are not already included in local General Plans.

TCM 10. Youth Transportation

Impact

4.2-16 **TCM 10 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-16 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1 and 2. The Phase 1 study of youth transportation should have negligible travel impacts.

The provision of funds in Phase 2 to double school bus services would result in added bus trips on public streets. School buses climbing hills and stopping at bus stops would delay traffic. This would be compensated for by reductions in student travel by private auto, which would result in less delays for other vehicles.

Impacts From Traffic Operation Management Control Measures

TCM 11. Freeway Traffic Operations System

Impact

4.2-17 **TCM 11 would result in significant increases in traffic congestion and delay on local streets due to freeway ramp metering.**

Mitigation Measure

4.2-17 *Caltrans would develop and implement a traffic control plan for each facility to be metered. Traffic control plans would include measures specified in TCM 12, such as optimization of current signal coordination on affected local streets, installation of improved traffic control and coordination devices (new controllers, interconnect conduit, master controllers, and new traffic signals), installation of traffic diverters to prevent diversion to side streets, improved guide signing, peak period parking prohibitions, and local street widenings. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1, 2, and 3. The Phase 1 action to improve the traffic surveillance system on the approaches to the Bay Bridge would reduce the delay that occurs when an accident happens on the approaches to the bridge. Better incident management would also reduce secondary accidents that frequently occur after the initial accident. There would be some additional temporary delays during construction and some additional temporary vehicle trips generated by construction workers.

The remaining Phase 1 actions to prepare various plans would have no significant travel impacts.

The Phase 2 action to implement a regional traffic surveillance system would reduce delays associated with unexpected incidents, such as traffic accidents. Better incident management would also reduce secondary accidents that frequently occur after the initial accident. Again there would be some temporary increases in delay during construction and some temporary increases in

construction worker vehicle trips that would be compensated for by delay reductions after the system is in operation.

The Phase 2 action to implement a regional ramp metering system would reduce delays for long-distance freeway travelers while increasing delays for drivers diverted to local streets. Congestion would increase on local streets. The net effect would be an overall delays reduction when totaled over all travelers. There would be some temporary increases in delay during construction and some temporary increases in construction worker vehicle trips. There would also be a modest reduction in accidents on the freeway and a possible minor increase in accidents on local streets due to the higher traffic volumes and heavier congestion on local streets.

The Phase 2 action to test automated vehicle identification (AVI) for toll collection on the Bay Bridge should result in reduced delays for drivers due to speedier toll collection. No delay reductions are expected since the metering system at this bridge controls delay on this facility rather than the toll collection. If implemented on other bridges, there would be some reductions in delay. There would be some temporary increases in delay during construction and some temporary increases in construction worker vehicle trips that would be compensated for by delay reductions after the system is in operation.

The impacts of Phase 3 use of new funds to fund unknown new highway technology cannot be determined at this time.

TCM 12. Arterial Traffic Management

Impact

4.2-18 **TCM 12 would result in a net decrease in travel delay which would encourage an increase in vehicle-trips and vehicle-miles traveled (VMT). This increase in vehicles would not be enough to cause delay to return to existing levels. This would be a less than significant impact.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

TCM 15. Rideshare Incentives

Impact

4.2-21 **TCM 15 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-21 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1 and 2. The Phase 1 action to promote employer subsidies would generate a few additional vehicle trips by participants promoting the program and increased carpool trips, which would be compensated for by reductions in employee vehicle trips in single-occupant vehicles.

Phase 2 legislation allowing free bridge tolls for HOVs would increase HOV trips where implemented. These increases would be compensated for by reductions in vehicle trips in single-occupant vehicles.

Impacts From Indirect Source Review Measure

TCM 16. Indirect Source Control Program

Impact

4.2-22 **TCM 16 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect. TCM 16 is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.**

Mitigation Measure

4.2-22 *None recommended or required.*

This TCM would be implemented in Phase 1. The likely travel impacts of this TCM are difficult to identify in the absence of information on the contents of an "indirect source control" program and the lack of any experience to date with such a program.

Improved site designs should result in improved traffic operations on-site. Mixed use development reduces vehicle-trips by internalizing some trips. Higher-density development increases total vehicle trips and transit trips, although the trip rate per square foot decreases. Charging for parking could result in back-ups at the entrances to lots that could be mitigated with improved design. Traffic management at special events should improve traffic operations. The review of airport expansion plans and capacity improvement projects would result in uncertain travel impacts.

Impacts From Implementation Support Measures

TCM 17. Public Education

Impact

4.2-23 **TCM 17 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This could have a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-23 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1, 2, and 3. The extra vehicle trips generated by participants in this program would be compensated by reductions in vehicle trips resulting from the program.

TCM 18. Higher Density Zoning Near Transit

Impact

4.2-24 **TCM 18 would result in potentially significant increases in parking overflows onto local streets and nearby transit station parking lots.**

Mitigation Measure

4.2-24 *Cities and counties would require developers to prepare and implement parking control plans to detect and correct overflow parking problems. The mitigation program would include actions such as setting up residential parking permit programs, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

Impact

4.2-25 **TCM 18 would result in potentially significant increases in traffic on local streets and highways serving rail transit stations.**

Mitigation Measure

4.2-25 *Cities and counties would prepare and implement traffic access and control plans for each transit station. These plans would include measures similar to those in Mitigation 4.2-6 and set impact fees to fund improvements. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

This TCM would be implemented at various levels in Phases 1 and 2. The Phase 1 action to conduct a study would have no significant impact on travel. The Phase 2 higher density development in the vicinity of transit stations would increase vehicle traffic and parking demands in the vicinity of these sites.

The neighborhoods surrounding each station would experience increased traffic. Increased transit ridership would partially mitigate the increased traffic. Trip reductions resulting from compensating reductions in allowable development away from transit stations would compensate for the increased traffic in the vicinity of the stations. If such compensating development reductions were not made, this TCM would result in a net increase in vehicle travel as well as an increase in transit travel.

At locations where the parking demand exceeds the parking lot capacities, there would be overflow parking in the neighborhoods. This impact could be reduced with parking time limit restrictions, residential parking permit programs, and/or parking meters.

TCM 19. General Plan Air Quality Elements

Impact

4.2-26 **TCM 19 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This could have a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-26 *None recommended or required.*

This TCM would be implemented in Phase 1. The Air Quality Element (AQE) would provide consistency between the AQE, Land Use Element, Transportation Element and Housing Element. It would encourage mixed use, infill development, and compact development near transit (particularly residential).

TCM 20. Demonstration Projects

Impact

4.2-27 **TCM 20 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-27 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1 and 2. The Phase 1 actions to seek sponsors and conduct studies would have no significant impact on travel. Successful demonstration projects would result in vehicle trip reductions. Unsuccessful demonstration projects would not yield vehicle trip reductions.

The Phase 2 action to conduct an automated fee collection project would be redundant to the AVI test contained in TCM 11 unless it were operated at a location other than the Bay Bridge. The automated fee collection may or may not result in increased delays for drivers depending on the speed of vehicle identification. If implemented on the Bay Bridge, no delay reductions would be expected because the metering system at this bridge controls delays on this facility rather than the toll collection. There would be some temporary increases in delay during construction and some temporary increases in construction worker vehicle trips, which would be compensated for by delay reductions resulting from reduced vehicle travel after the system is in operation.

TCM 21. Revenue Measures

Impact

4.2-28 **TCM 21 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

This TCM is not expected to produce significant negative impacts on travel delays, travel safety, travel discomfort or parking overflow.

Mitigation Measure

4.2-28 *None recommended or required.*

This TCM would be implemented at various levels in Phases 1 and 2. The increased bridge tolls, vehicle registration fees and gasoline tax would have a modest reducing effect on vehicle travel.

Impacts Related to Ozone Excess "No Drive Days"

Intermittent Transportation Control Measure G3

Impact

4.2-29 **Measure G3 would result in potentially significant increases in parking overflows onto local streets and increases in traffic near transit stations.**

Mitigation Measure

4.2-29 *See Mitigation Measures 4.2-5 and 4.2-6.*

This measure would involve development of a program to encourage citizens to voluntarily avoid driving during forecast ozone excess days. The form of the program is not specified, but presumably it would involve radio and television broadcasts announcing a "smog alert" and requesting citizens to avoid driving that day. This measure would reduce vehicular travel and increase transit ridership in proportion to its success. Increased transit ridership would result in increased traffic and parking in the vicinity of transit stations.

Intermittent Transportation Contingency Measure G4

Impact

4.2-30 **Contingency Measure G4 would result in potentially significant increases in parking overflows onto local streets and increases in traffic near transit stations.**

Mitigation Measure

4.2-30 *See Mitigation Measures 4.2-5 and 4.2-6.*

If necessary to implement, this measure would involve development of a mandatory program to require citizens to avoid driving during forecast ozone excess days. The form of the program has not been specified, but presumably it would impose restrictions such as allowing only cars with odd-numbered license plates to drive on odd-numbered days when an ozone excess day is forecasted. This measure would reduce vehicular travel and increase transit ridership in proportion to its success. Increased transit ridership would result in increased traffic and parking in the vicinity of transit stations.

Impacts from Motor Vehicle Control Measures

Measure H1. This measure would consist of a citizen complaint program for smoking vehicles. This measure is not expected to significantly impact travel behavior.

Contingency Measure H2. If found necessary to implement, this measure would consist of a program to buy and destroy older autos. This measure is not expected to significantly impact travel behavior.

Measure H3. This measure would require large vehicle fleet owners to purchase cleaner fueled vehicles. This measure is not expected to significantly impact travel behavior.

Contingency Measure H4

Impact

4.2-31 **Measures G3, H1, H3 and Contingency Measures H2, H4 and G4, would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

Mitigation Measure

4.2-31 *None recommended or required.*

If Contingency Measure H4 is implemented, this measure would require transit agencies to electrify certain bus routes. Electric buses generally have higher acceleration performance than diesel buses, thus improving their operations in mixed traffic. This measure would not be expected to significantly impact travel behavior.

Impacts from Market-Based Measures.

Impact

4.2-32 **The Market-Based Measures could result in significant increases in traffic on local streets and highways parallel to toll facilities.**

Mitigation Measure

4.2-32 *MTC and any other implementing agencies would prepare and implement a traffic impact study and traffic control plan for each proposed toll facility. Traffic control plans would include measures such as: installation of additional traffic control devices (stop signs and traffic signals), installation of traffic diverters, improved guide signing, improved parking lot driveway design, improved pick-up/drop-off area design, street widenings, the construction of new streets, the demand reduction techniques contained in TCMs 1 and 2, and the transit improvement measures contained in TCMs 3, 4, 5, and 6. The Traffic control plans would include allocation of tolls to fund improvements on parallel facilities. Since it is not known at this time whether this mitigation measure would be completely effective, this impact is considered significant and unavoidable.*

Impact

4.2-33 **The Market-Based Measures would result in potentially significant increases in parking overflows onto local streets and residential parking lots.**

Mitigation Measure

4.2-33 *Agencies requiring parking fees would fund preparation of jurisdiction-specific parking impact studies and mitigation program for jurisdiction in which the parking fee is to be levied. The mitigation program would include actions such as setting up residential parking permit programs, reducing on-street parking time limits, increasing parking limit enforcement, installing parking meters, increasing parking meter rates, and increasing fines for parking violations. Since it is not known at this time whether this mitigation measure would be completely effective, this impact is considered significant and unavoidable.*

The Market-Based Measures would be implemented in Phase 3. The transportation impacts of these Phase 3 actions would be to further reduce traffic congestion, thus reducing delay and improving mobility. The added fees and tolls in many cases could be collected through the mail or at existing toll collection stations. Where the tolls cause vehicles to divert to parallel facilities, there would be a significant increase in traffic on local streets.

New toll facilities created for the collection of the new congestion fees would cause increased congestion at the toll facility (varying according to the type of fee collection method used). Where the tolls cause vehicles to divert to parallel facilities, there would be a significant increase in traffic on local streets.

Charging the parking fee to users would probably require reconstruction of parking lot entrances and exits to provide access control and to allow for the collection of the parking fees. There would be a shifting of parking to residential lots and onto non-commercial district public streets. Residents may be impacted by parking overflows into their lots and neighborhood streets. Local agencies might have to install parking meters on nearby streets or they might establish "residential parking permit programs" in the vicinity of all areas affected by the parking fees.

Stationary Source Control Measures

Stationary Source Control Measure Groups "A" through "F"

These measures are not expected to generate significant travel-related impacts.

Impacts from Intermittent Control Measures

Intermittent Control Measure G1

Impact

4.2-34 **Measure G1 would result in potentially significant increases in parking overflows onto local streets and increases in traffic near transit stations.**

Mitigation Measure

4.2-34 *See Mitigation Measures 4.2-5 and 4.2-6.*

This measure would encourage citizens to postpone discretionary activities during forecast ozone excess days. The form of encouragement is not specified, but presumably it would involve radio and television broadcasts announcing a "smog alert" and requesting citizens to postpone their travel activities. This measure would reduce vehicular travel and increase transit ridership in proportion to its success. Increased transit ridership would result in increased traffic and parking in the vicinity of transit stations.

Intermittent Control Measure G2

Impact

4.2-35 **Measure G2 would result in a net reduction in vehicle-trips and vehicle-miles traveled (VMT). This would be a beneficial travel effect.**

Mitigation Measure

4.2-35 *None recommended or required.*

This measure would have the BAAQMD require industries to postpone certain unspecified activities during forecast ozone excess days. The types of motor vehicle-related activities to be

postponed are unclear, but it might call for reduced plant operations, resulting in furlough days for workers and reductions in deliveries made that day. This measure would reduce vehicular travel, which would reduce delays.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

This section briefly discusses the cumulative impacts of the Clean Air Plan in combination with other adopted congestion management and clean air plans.

The CAP incorporates the FTCMs contained in the TCMs of the 1990 MTC Contingency Plan to the 1982 SIP as well as many other TCMs. Consequently, the cumulative impacts of both documents are equivalent to the impacts of the CAP by itself.

The Congestion Management Programs (CMP) prepared by the counties must contain capital improvement programs that conform to the TCMs contained in the Clean Air Plan. The CMP must in addition contain measures that reduce traffic congestion. Consequently, the cumulative negative travel impacts of both plans together are expected to be equivalent to those of the CAP by itself, with the addition of added traffic congestion reductions due to additional non-TCM measures contained in the CMP.

With respect to anticipated growth and development in the Bay Area, the impacts of growth on travel will be further roadway congestion and crowding of transit facilities. The CAP would offset roadway congestion and, by calling for improved transit facilities, would offset transit congestion as well. On the other hand, the CAP would add to parking overflows into local streets and increased traffic densities on local streets surrounding transit stations. These impacts could be mitigated through rigorous adoption of the mitigation measures proposed in this section.

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1. Metropolitan Transportation Commission, Draft Regional Transportation Plan for the San Francisco Bay Area, April 1991. Estimate derived from Table V-2, page 198, recognizing that this table does not include city and county gas tax and General Fund contributions to local road construction and operation.

2. Metropolitan Transportation Commission, "Air Quality Conformity Assessment," 1990-94 Transportation Improvement Program, Volume II, Section 10, April 24, 1991.

3. William F. Hein; Memorandum to cities, counties, traffic authorities, transit operators, other interested parties; MTC Resolution No. 2270 Air Quality Conformity Procedures for the Transportation Improvement Program and the Regional Transportation Plan; April 30, 1991.

4. Metropolitan Transportation Commission, MTC Resolution No. 2270, April 24, 1991, Appendix "A".

5. California Air Resources Board, Congestion Management Program Resource Handbook, November 1990, Sacramento, CA.

6. Ibid.

7. Metropolitan Transportation Commission, Final Transportation Control Measure Plan, November 1990, San Francisco, CA.

8. Association of Bay Area Governments, Draft Bay Area '91 Clean Air Plan (CAP), April 1991, Figure 10, page 57.

9. Bay Area Travel Forecasts..., Table 12, page 48, Op. cit.

10. Ibid.

11. "Summary of State TCM Plan Emissions Reductions: All Phases" (unpublished), by Deakin, Harvey, Skabardonis, April 1, 1991. "Detailed State TCM Plan Emissions Reductions" (unpublished), by Deakin, Harvey, Skabardonis, April 2, 1991. "Definition of State Plan TCMs" (unpublished), by Deakin, Harvey, Skabardonis, March 30, 1991.

12. "Near-Term TCM Effects, Appendix: Summary of Emissions Reduction Estimates for Near-Term Transportation Control Measures"(unpublished), by Harvey/Deakin, Feb. 7, 1990.

13. Metropolitan Transportation Commission, Preliminary Cost-Effectiveness Calculations for TCMs (unpublished), Nov. 1990.

14. The reader should note that the entries in the table are necessarily to the one hundredth of one percent (due to very small magnitudes of the impacts associated with each individual TCM's), however; the accuracy of the estimated reductions for each TCM is not claimed to be at this high a level of precision. The relative magnitudes and direction of the estimated percentage reductions associated with each TCM are considered to be fairly reliable for the purposes of choosing one TCM over another, however; the absolute value of each trip reduction estimate is not considered to be accurate to this high degree of precision.

15. See previous endnote.

16. Metropolitan Transportation Commission, Draft Regional Transportation Plan for the San Francisco Bay Area, April, 1991.

17. Metropolitan Transportation Commission, Draft Environmental Impact Report, Regional Transportation Plan, JHK Associates, April 1991.

18. Metropolitan Transportation Commission, 1991-95 Transportation Improvement Program, Volume 1: Transit Element, September 26, 1990.

19. Metropolitan Transportation Commission, 1991-95 Transportation Improvement Program, Volume 2: Highway and Other Elements, Not yet published.

20. Metropolitan Transportation Commission, 1990-94 Transportation Improvement Program, Volume II, Section 10, Air Quality Conformity Assessment, April 24, 1991.

21. See endnote 12.

22. In a typical residential parking permit program, the street is posted for a maximum of two-hour parking unless the vehicle is marked with a permit. Vehicles displaying the residential parking permits can park all day. Permits are sold by the local agency at cost only to local residents.

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4.3 LAND USE AND PLANNING

This section identifies and evaluates potential land use and planning impacts of the proposed Bay Area Air Quality Management District Clean Air Plan (CAP). Specifically, the analysis evaluates the CAP in relation to land use patterns, local land use plans and policies, and in relation to existing and planned land uses.

Although land use conflicts are often social and economic rather than environmental in nature, local plans and ordinances, together with the existing built environment, provide the context in which planning for the development of each jurisdiction takes place. The following analysis addresses the compatibility of the proposed CAP plan within this planning context.

SETTING

The CAP would affect all or part of the Bay Region's nine counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma), which in 1990, accommodated 5.95 million people (Figure 3-1). The BAAQMD jurisdictional area encompasses 5,600 square miles, and does not include some portions of Solano and Sonoma counties. The Bay Region contains 98 cities and 7,721 special districts (not counting school districts).

Land Uses by County

Table 4.3-1 illustrates the amount of land already devoted to residential, local-serving employment, and basic employment land uses as of 1985. This table shows that just over 14 percent, or 653,000 acres, of the total land acreage in the nine counties was developed in 1985. San Francisco is the most urbanized county, nearly 79 percent developed. The most rural county is Napa with 17,300 developed acres for just over 3 percent of the land area. Alameda, Contra Costa, and San Mateo Counties have slightly less than a quarter of their land area developed with urban uses.

Table 4.3-2 shows available land supply in the region based on local development regulations (ABAG Local Policy Survey Update in 1988). Of the 285,600 acres available for development in the region for the post-1985 period, Solano County has the greatest amount, 51,800 acres. Of the nine counties, Alameda has the greatest percentage of its land area available for development, 10.1

TABLE 4.3-1

DEVELOPED LAND IN 1985
(THOUSANDS OF ACRES)

		Developed Land Area (Net Acres)				
County	Total Area[1]	Residential[2]	Local Serving[3]	Basic[4]	Streets/ Highways	Percent Developed
Alameda	488.7	54.3	13.3	19.6	27.3	23.4
Contra Costa	480.0	59.7	10.2	14.3	24.3	22.6
Marin	344.3	22.8	3.5	2.9	8.5	11.0
Napa	508.9	9.9	1.9	1.7	3.7	3.4
San Francisco	31.2	9.9	3.3	3.4	7.9	78.6
San Mateo	297.6	36.3	7.2	7.3	16.1	22.5
Santa Clara	854.2	82.0	16.2	20.5	34.0	17.9
Solano	546.8	18.9	4.8	9.9	9.5	7.9
Sonoma	1,042.5	64.4	6.5	4.5	12.3	8.4
Region	4,594.3	358.1	67.0	84.3	143.6	14.2

[1] Total area for each county from 1980 census tract acreages, excluding bay waters.
[2] Residential acreage is comprised of land occupied by residential uses, usually with densities of one unit per five acres or greater.
[3] Local-serving acreage corresponds to land occupied by local-serving employment, most often local commercial uses, schools, and local public activities and institutions.
[4] Land occupied by basic employment activity is usually industrial land but includes major universities, state and federal facilities, and some corporate offices.

Source: ABAG, Projections '90

TABLE 4.3-2

LAND AVAILABLE FOR DEVELOPMENT, 1985-2005
(THOUSANDS OF ACRES)

		Available Land Area (Net Acres)[1]			
County	Total Area[2]	Residential	Local Serving	Basic	Percent Available[3]
Alameda	488.7	35.0	2.4	11.9	10.1
Contra Costa	480.0	35.9	3.5	4.8	9.2
Marin	344.3	20.8	0.8	1.9	6.9
Napa	508.9	6.0	0.2	3.1	1.8
San Francisco	31.2	0.4	0.1	0.2	2.1
San Mateo	297.6	15.7	1.9	1.6	6.4
Santa Clara	854.2	25.5	1.5	11.0	4.5
Solano	546.8	29.9	3.7	18.2	9.5
Sonoma	1,042.5	44.7	1.4	3.6	4.8
Region	4,594.3	213.9	15.6	56.1	6.2

[1]Available land includes estimates of vacant and non-vacant (redevelopable) land available for development.
[2]Total area from 1980 census tract acreages, excluding bay waters for the entire nine county region.
[3]Available land as a percentage of total area.

Source: ABAG, Projections '90

percent; but 12,300 of these 49,300 acres are not available for development until after the year 2000. The region's available land supply is 6.2 percent of its total land area.

Land Use Jurisdiction Within the Bay Area

The CAP recommends policies and programs which would need to be considered by local governments in planning for development. At the present time, a regionwide governing body does not exist to direct and implement land use planning policies for the entire Bay Area. Local governments are responsible for regulating land use and for providing public services to support development.

The type and extent of growth that occurs within the region is closely tied to the development policies of the cities and counties within the Bay Area. Development policies include general and specific plans, local zoning regulations, building permit allocation measures and growth initiatives. Land development in the region is driven by these policies along with market forces which shape where and when residential, commercial, industrial and institutional development activities take place.

The State Planning Act requires each local planning agency to prepare, and the local legislative body to adopt, a comprehensive, long-term general plan. These general plans guide the physical development of the county or city and any land outside its boundaries, which, in the planning agency's judgement, bears relation to its planning jurisdiction. Once adopted, the general plan is used by the city and county planning departments and other agencies and departments as a general guide to the future development of the city or county. The plans provide a basis for making land use decisions, especially in the areas of zoning, subdivisions, environmental controls, and the location and design of public facilities.

California law requires all of the elements in the local general plan to be internally consistent. In addition, the zoning ordinance must be consistent with the general plan.

Regionwide planning for the Bay Area takes place through several agencies, including the Bay Area Air Quality Management District, Bay Conservation and Development Commission, California

Coastal Commission, Association of Bay Area Governments, and the Metropolitan Transportation Commission.

The Bay Conservation and Development Commission (BCDC) and California Coastal Commission (CCC) maintain jurisdiction over the Bay and Coastal Zone, respectively. Although they do not provide regionwide planning and policy guidance due to their limited areas of jurisdiction, they do provide permitting authority and policy guidance for their respective jurisdictions. BCDC maintains jurisdiction over the San Francisco Bay and certain other waterways and managed wetlands. The BCDC Commission is authorized to control both: 1) Bay filling and dredging, and 2) Bay-related shoreline development. The CCC regulates use of coastal resources within the coastal zone.

The Association of Bay Area Governments (ABAG) provides regional policy guidance for the Bay Area. ABAG develops a Regional Plan with recommendations of the regional planning board concerning current or future problems that may, in its opinion, affect the region as a whole and are proper for inclusion in the regional plan. The Regional Plan is advisory only and does not have any binding effect on the counties and cities located within the boundaries of the regional planning district. ABAG also prepares and updates demographic projections for the region.

The Metropolitan Transportation Commission (MTC) was created by the California State Legislature, in 1970, to prepare a Regional Transportation Plan (RTP) for the nine counties of the San Francisco Bay Area. In addition to preparing a plan, MTC has several other responsibilities which include: 1) approving transportation projects that receive state or federal funding; 2) allocating of funds, from various sources, for transit operations; 3) evaluating the performance of the transportation system and the provision of transportation services; 4) promoting and setting guidelines for transit system coordination; and 5) advocating adequate transportation funding.

The RTP is the transportation element for the Regional Plan of the Association of Bay Area Governments; and, conversely, the land use policies of ABAG's plan guide the development of the RTP. The RTP also must consider the plans and policies of the BCDC, ABAG, CCC and the BAAQMD. Implementation of the RTP occurs based upon statutory authority, MTC policy, and the participation of various local governments, private agencies, and citizens.

MTC is responsible for reviewing and approving applications for federal or State grants initiated by a county, city, or transportation district within the region for compatibility with the RTP. All transportation projects which require a federal action, such as a locally funded project which requires plan approval by the Federal Highway Administration (FHWA), also require approval by MTC. In addition, MTC provides review of environmental documents in the context of the applicable provisions of CEQA, NEPA and guidelines for its implementation issued by the Federal Government, and the California Procedures for Intergovernmental Review of Federal Financial Assistance and Direct Development Activities.

The BAAQMD is a basin-wide district governed by a Board of Directors composed of elected officials of local governments within the nine Bay Area counties. Subject to the powers and duties of the California Air Resources Board, the BAAQMD adopts and enforces rules and regulations to achieve and maintain air quality standards.

The California Clean Air Act requires that the BAAQMD develop indirect source (IS) control programs as part of the CAP. Indirect sources are facilities and land uses that produce or attract motor vehicle traffic and thereby indirectly produce air pollution. IS control programs represent a portion of the CAP that would directly affect land use development in the Bay Area.

Growth Management in the Bay Area

The CAP would affect development in the Bay Area, both directly and indirectly, through implementation of controls on both stationary and mobile pollution sources. Although the CAP would provide a guide for development based on air quality regulations, local jurisdictions would maintain control over land use development. Land use development consistent with the goals of the IS control measure proposed in the CAP has proceeded in some local jurisdictions through growth management measures which regulate the amount, timing, location and character of development.

Growth management programs in the Bay Area have been implemented largely as a reaction to rapid suburbanization and the growth of environmental concerns along with increasing traffic congestion. In the fall of 1988, ABAG surveyed planning directors of all cities and counties in the region about existing local growth management programs, focusing on the nature and effectiveness

of local growth controls. Responses were received from 65 percent of these jurisdictions. The following types of growth management controls were identified:

- To Control the Amount or Intensity of Development:
  - Downzoning existing developed areas
  - Height or bulk restrictions
  - Population ceilings or caps
  - Limited development zones

- To Control the Location of Development:
  - Urban service area boundaries
  - Open space acquisition

- To control the Timing or Rate of Development:
  - Annual limits on the number of new housing units
  - Annual limits on the amount of new office development
  - Rationing of utility hookups

- To Ensure that Infrastructure Meets Certain Standards:
  - Traffic service levels
  - Water or sewer service levels

- Miscellaneous Techniques:
  - Job-housing balance
  - Tax relief measures

The majority of identified growth management measures control development through traditional zoning and building-intensity regulations. Newer measures, however, are moving away from such traditional zoning controls. More recent efforts are establishing comprehensive development review processes that allow growth only when the infrastructure adheres to certain predefined service levels or performance standards.

The survey concluded that cities and counties throughout the San Francisco Bay Area are actively involved in growth management and that there is no clear correlation between the extent of such measures and community size or affluence.

The same growth pressures that have contributed to the implementation of growth management measures in the Bay Area have lead to urban spillover in the counties surrounding the Bay Area. The fastest growing areas are those located along highways with easy access to the San Francisco Bay Area. These former agricultural communities have been transformed to suburban residential

communities for the employment centers of the Bay Area due to the lack of affordable housing for workers in the Bay Area. In addition, industries have been moving to these areas in order to take advantage of the affordable land prices and large labor supply. As growth pressures increase in the Bay Area, these "spillover" effects will increase.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

Control measures in the CAP have the potential to affect land use patterns and development in the Bay Area and, indirectly, the surrounding counties. The CAP would impose strict controls on stationary air pollution sources, such as industry, and mobile air pollution sources, potentially causing a redistribution of land uses.

Standards of Significance

The CEQA Guidelines indicate that a project will normally have a significant adverse land use impact if it would conflict with adopted land use plans and zoning ordinances of the community where the project is located. For the purposes of this EIR, and in accordance with CEQA guidelines, the following are considered potentially significant land use and planning conflicts: 1) a proposed project that would induce substantial growth or concentration of population; 2) a proposed project that would result in the disruption or division of the physical arrangement of an established community; 3) a proposed project that would conflict with established recreational uses of an area; and 4) a proposed project that results in a use substantially incompatible with surrounding existing uses.

Land use impacts identified for the proposed project are set forth below. According to Section 40716 of the California Clean Air Act, air districts cannot infringe on the existing authority of counties and cities to plan or control land use, and authority over land use has not been granted to air districts.[1]

Overview

Implementation of the CAP could result in land use development which substantially improves air quality as development becomes more centralized in response to the control measures in the CAP.

Development patterns resulting from implementation of the CAP would reduce urban sprawl in the long term through development of mixed-use work and residential centers along transit corridors, and an improved jobs/housing balance in communities. These new development patterns would also reduce the need for conversion of land use to accommodate additional major motor vehicle transportation corridors.

The thrust of the CAP with respect to land use is to concentrate development near transit stations or corridors, and encourage a jobs/housing balance which minimizes auto dependence. These land use goals to improve air quality, and consequently benefit the health and welfare of individuals in the Bay Area, are contrary to land use impacts as identified under CEQA. CEQA, as discussed under the Standards of Significance, identifies the growth or concentration of population, such as around a transit center, as a significant land use conflict. Both the concentration of population and a change in jobs/housing balance, as proposed in the CAP, could be identified as disrupting the physical arrangement of established communities which is another criterion under CEQA for identifying a significant land use impact. Therefore, while some control measures in the CAP may have land use impacts that would be considered to be adverse under CEQA, the intent of these measures is to improve the quality of life in the Bay Area through better air quality and reduced traffic congestion.

Mobile Source Control Measures

<u>Impacts from Employer-Based Trip Reduction Measures</u>

Trip reduction measures, TCMs 1 and 2 would not have adverse land use impacts.

<u>Impact</u>

4.3-1 **Trip reduction measures, TCMs 1 and 2, would reduce parking needs of employment and commercial centers, thereby making land available for other uses. This would be a beneficial effect.**

Reduced parking needs at employment and commercial centers would make land available for other uses for which it is zoned. In some cases, zoning amendments to general plans could make this land available to alternative transportation facilities such as non-motorized transportation (i.e.,

bike lanes and pedestrian access) and public transit centers. In addition, with changes in zoning where required, the land could be used for mixed uses.

Mitigation Measure

4.3-1 *None recommended or required.*

Impact

4.3-2 **Trip Reduction Measures, TCMs 1 and 2, would reduce nuisance impacts from traffic noise to surrounding existing land uses. This would be a beneficial effect.**

The trip reduction control measures would reduce congestion, thereby reducing noise and associated nuisance impacts to sensitive receptors along the transit corridors, particularly residential uses.

Mitigation Measure

4.3-2 *None recommended or required.*

Impacts from Mobility Improvements

Impact

4.3-3 **Expansion of rail lines (TCM 4), HOV lanes (TCM 8), ferry terminals (TCM 7), and improved bicycle access (TCM 9) would alter the existing land use patterns and require right-of-way dedication and transit corridor expansions which may conflict with existing general plans and zoning. This would be a significant land use impact.**

Transit improvements involving the expansion of rail lines and HOV lanes would change existing land uses. Through transit planning in accordance with the Metropolitan Transportation Commission, most of these corridors have been identified in the land use plans of communities through which they will pass, although land use adjustments may be required to acquire new routes. Local jurisdictions (counties) must prepare an annual Congestion Management Plan (CMP), which must be developed in consultation with MTC, transit providers, Caltrans, and the BAAQMD. The CMP must be consistent with regional plans. CMP projects may then be included in the Transportation Improvement Program (TIP). Regional coordination of local transit planning (i.e.,

CMP) and the MTC TIP allow for the most effective means of choosing projects of both local and regional significance which provide the most efficient and effective transportation services.

Mitigation Measures

4.3-3 *To reduce the impacts of these control measures to a less than significant level, the BAAQMD would encourage the responsible governmental agencies to amend general plans and CMPs so that local land use decisions mesh with regional goals. This would include the following steps:*

a) *Cities and counties should revise General Plan land use and circulation elements to include the TCM policies and programs of the CAP in their respective jurisdictions so that local land use decisions take into account regional goals with respect to transportation and air quality.*

b) *General Plans and zoning should encourage high density development around transit centers. Local jurisdictions should coordinate development policies along transit lines and centers with regional and local transportation authorities.*

c) *General Plan land use elements should encourage balanced housing and commercial development in order to avoid the creation of job-poor residential communities on transit corridors. As the jobs/housing balance improved, there would be a reduction in the need for the expansion of transit corridors.*

d) *Bicycle and pedestrian routes should be included on local jurisdictions General Plans' Circulation Elements. In addition, land use elements should plan for linkage of development components by pedestrian and bicycle routes.*

e) *The County CMPs would be amended to be consistent with land use changes resulting from implementation of the CAP proposed transit improvements.*

Transit planning and high-density land use development have been attempted through the BART Joint Development Program, whereby BART works with local jurisdictions along the BART corridor to coordinate and encourage high density development around BART stations. One of the more successful examples occurs at the Pleasant Hill BART Station, where there is a mix of medium- and high-density housing and office complexes. The mixed-use development specific plan, proposed by Contra Costa County, occurred through cooperation with BART, which provided land exchanges for development. Similar programs are being proposed around the BART stations at El Cerrito, Hayward and Concord.

Impact

4.3-4 **Rail extensions, TCM 4, could result in the disruption or division of the physical arrangement of an established community. This would result in a significant land use impact.**

Extension of rail lines to existing established communities would be disruptive of the physical environment, defined under CEQA as a significant land use conflict. Implementation of TCM 4 would result in the BART extensions to Colma, San Francisco International Airport, West Pittsburg, Dublin, and Warm Springs. In addition, CalTrain would be extended to downtown San Francisco and a light rail transit system would be constructed for the Tasman Corridor in Santa Clara County.

Rail extensions under TCM 4 may develop through a variety of different scenarios. Above ground rail lines through established communities would be a divisive element. Transit stations located within established communities would also be a disruptive force. To avoid these land use impacts, transit lines and transit stations may be located on the periphery of established communities, however, this may induce substantial growth or concentration of population around the new transit center. This is also identified as a significant land use impact under CEQA.

Mitigation Measure

4.3-4 *Transit authorities responsible for rail extensions resulting from implementation of the CAP would be encouraged by the BAAQMD (when feasible) to locate new rail lines and stations underground where they would otherwise conflict with established communities. While this would lessen the disruption to established communities this impact would remain significant and unavoidable.*

Impacts from Traffic Operation Management Control Measures

Impact

4.3-5 **Traffic Operation Management control measures, TCMs 11 and 12, would reduce nuisance impacts from traffic noise to surrounding existing land uses. This would be a beneficial effect.**

See discussion under Impact 4.3-3.

Mitigation Measure

4.3-5 *None recommended or required.*

Impacts from User Incentives

These measures would not affect land use development and character in the Bay Area.

Impacts from Indirect Source Review Measures

Impact

4.3-6 **The Indirect Source Review Measure (TCM 16) would require land use development to take into account air quality effects. This would alter the pattern of land use to encourage development which minimizes auto dependence and concentrates growth near transit stations. This would result in a significant land use impact.**

IS measures would require development to meet air quality standards and mitigate for traffic generation. IS control responsibilities would be administered by the BAAQMD or delegated to city and county governments that adopt BAAQMD-approved programs. Delegation would assure that local and regional air quality concerns are incorporated into their plans and implementation programs. This mixed land use development pattern which would emerge is sometimes labeled a "city-centered regional development concept" or a "compact growth scenario." An IS control program could promote such a development pattern by emphasizing in-fill, mixed-use and/or higher-density development near transit stations (TCM 18). Although this control measure would have significant land use impacts under CEQA, the benefits include: reduced traffic congestion; reduced emissions of air pollutants from motor vehicles; economies of scale for energy conservation and infrastructure development; and open space preservation.

Mitigation Measure

4.3-6 *The BAAQMD would encourage city and county governments to:*

a) *Amend general plans to contain an air quality element which meets the standards of the BAAQMD and which coordinates transportation linkages with land use development (TCM 19).*

b) *Provide buffer zones around mixed land uses in order to reduce nuisance impacts of high density mixed developments.*

c) *Amend general plans allowing for high densities around transit stations.*

Implementation of this Mitigation Measure would reduce this impact to a less than significant level.

Impact

4.3-7 **The Indirect Source Review control measure (TCM 16) could conflict with growth management policies of local jurisdictions by inducing growth near transit stations. This would be a potentially significant impact.**

High-density, mixed-use developments could conflict with established growth management policies which are currently in place and which discourage high-density mixed development.

Mitigation Measure

4.3-7 *The BAAQMD would encourage local jurisdictions to modify growth management policies already in place to allow high density mixed development nodes near transit centers, thereby reducing the land use impact to a less than significant level.*

Impacts from Implementation Support Measures

Implementation of Air Quality Element for General Plans, TCM 19, would involve modifications by local governments to General Plans to reach conformity of local land use decisions with regional air quality goals. This would be a beneficial impact.

Revenue Measures, TCM 21, would have similar impacts to those discussed below under the Market-Based Transportation control measures, TCM 22 (with the exception of Impact 4.3-10), however the impacts would be much less pronounced.

Impact

4.3-8 **The implementation of Zoning Plans for Higher Densities Near Transit Stations, TCM 18, would induce substantial growth or concentration of population around transit stations and disrupt the physical arrangement of established communities. This would be a significant land use impact.**

This control measure seeks to derive the maximum benefit from the regional rail extension program. This would be accomplished by planning for higher densities, cluster development with mixed use (including childcare facilities), and transit-oriented design along mass transit lines. As stated in the Overview of this section, control measures, such as TCM 18, which propose higher densities near transit stations and a jobs/housing balance will conflict with land use impacts identified under CEQA. Based on the goals of the CAP, control measures are designed to improve the quality of the environment predominately by improving air quality. In this regard, TCM 18 would improve land use by encouraging land use development which is consistent with air quality planning goals. In addition, this control measure would conserve open space on the fringe of cities through in-fill development of land which is already developed at city centers. This would reverse the trend toward suburban expansion already plaguing the Bay Area. In spite of these findings, this control measure would be identified under CEQA as a significant land use impact.

Mitigation Measure

4.3-8 *The BAAQMD would encourage city and county governments to amend general plans to allow for high density and mixed-use zoning near transit stations, thereby reducing this impact to a less than significant level.*

Impacts Related to Ozone Excess "No Drive Days"

These measures would not impact land use in the Bay Area.

Impacts Related to Motor Vehicle Control Measures

These measures would not impact land use in the Bay Area.

Impacts from Market-Based Transportation Control Measures

Impact

4.3-9 **Parking Management measures adopted under TCM 22 would reduce parking needs of employment and commercial centers, thereby making land available for other uses. This would be a beneficial effect.**

See discussion under Impact 4.3-2.

Mitigation Measure

4.3-9 *None recommended or required.*

Impact

4.3-10 **Market-based transportation control measures, TCM 22, would make the use of automobiles more costly, and, thereby, create increased pressure for city and county governments to improve the jobs/housing balance and to provide adequate public transportation. This would be a potentially significant impact in that it would concentrate growth and disrupt established communities.**

As socioeconomic factors made auto use significantly more expensive, the pressures on communities to provide alternative transportation means and an improved jobs/housing balance would escalate. This would alter the existing land use mixes. Market-based measures would provide the greatest impetus for land use changes in the CAP.

Mitigation Measures

4.3-10 *See Mitigation Measures 4.3-1, 4.3-4, 4.3-5, 4.3-7, 4.3-8, and 4.3-9. Implementation of this Mitigation Measure would reduce this impact to a less than significant level.*

Impact

4.3-11 **Market-based transportation control measures, TCM 22, would reduce nuisance impacts to surrounding existing land uses. This would be a beneficial impact.**

See discussion under Impact 4.3-3.

Mitigation Measure

4.3-11 *None recommended or required.*

Stationary Source Control Measures

Impact

4.3-12 **Increased controls on stationary sources could cause a redistribution of industrial land uses within the Bay Area, disrupting the physical arrangement of established communities. This would be a potentially significant impact.**

Stationary source control measures could cause a shift in land use within the Bay Area as some industries leave the basin due to the economic implications of enforcing stricter air quality regulations. This could lead to a transformation of land uses in the Region from industrial uses to more commercial, retail and residential uses, thereby, changing the character of the existing region. Impacts to specific industries would vary depending upon the compliance costs with the 1991 CAP measures.

Mitigation Measure

4.3-12 *None available. This impact would remain significant and unavoidable with the implementation of this mitigation measure.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

In the long term, and with increased regional implementation authority, control measures of the CAP affecting land use and development would exert an increasingly important influence on local land use development. However, population growth and the demand for jobs, housing and associated infrastructure development will have a larger impact on land use patterns as discussed in the Population, Employment and Housing Section of this document. Relative to population growth, control measures of the CAP affecting future land use development would have fewer adverse impacts. Contrary to CEQA-identified land use impacts, the CAP may have beneficial land use effects because it serves to focus growth and development. Land use under the CAP would better utilize land that is already developed and conserve open space as well as promoting land use consistent with air quality planning.

Presently, socioeconomic factors and demographics in the Bay Area have shaped the nature and character of land use planning with respect to where and when growth occurs. In addition, local land use policies are guided by local jurisdictions, and as yet, regional land use authority does not

exist whereby CAP policies can be implemented in place of these local policies. Of the Phase 1 measures, Indirect Source Review would have the greatest effect on land use. Phase 2 would require new legislative authority in order to directly affect land uses in the region and would have mostly indirect effects on land use. Phase 3 would require authorizing legislation, but could potentially have the greatest effect on land use due to the socioeconomic factors involved in market-based transportation control measures.

With full implementation of the CAP measures, cumulative land use impacts could be potentially significant; however, as discussed in the impacts and mitigation section, many of the impacts after mitigation are considered less than significant or beneficial. In addition, even with CAP implementation, there are overriding socioeconomic and market factors, discussed above, that will continue to strongly influence land use development and character in the Bay Area. Due to the above reasons, overall cumulative land use impacts that may result directly from the CAP are not considered to be significant.

There is a possibility that the CAP, when fully implemented, could have an effect on neighboring areas. Counties adjacent to the Bay Area would absorb development which is unable to locate in the Bay Area due to IS control measures and other strict controls implemented through the CAP. On the other hand, since all non-attainment areas must adopt indirect source controls, the difference between regulations in the Bay Area and some adjacent counties may be negligible and probably would not significantly influence land use impacts. Mitigation measures for growth effects in adjacent counties could involve coordination of planning efforts with the Bay Area regional planning agencies. This could include development and implementation of a multi-regional plan which is consistent with regional plans to direct and control growth.

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1. BAAQMD, Issue Paper 5, CAP.

4.4 POPULATION, EMPLOYMENT AND HOUSING

SETTING

The Bay Area enjoys a very strong economy as exhibited by relatively high measures of income and low unemployment rates in comparison to California as a whole. During the last decade, however, population and employment in the region have grown at a much slower rate than in the rest of the State. Regional employment growth has been much stronger than population and labor force growth, contributing to problems with housing supply and affordability and transportation congestion. This section describes the demographics and economics of the region as well as the planning issues that relate to the proposed CAP measures.

Population

Growth Trends

California's population dramatically increased during the 1980s. The State's total population expanded by 7.1 million between the Census years of 1980 and 1990. California's population increased by 31.3 percent during the decade, from 22.7 million in 1980 to 29.8 million in 1990.

The nine-county Bay Area and each individual county grew much more slowly than the statewide average during the decade. Population in the Bay Area counties grew by more than 840,000 people, or 16.3 percent between 1980 and 1990.[1] This is about half the rate of population growth that occurred throughout California.

Santa Clara County absorbed 202,506 new residents, which was the largest population growth of any Bay Area county. Other large-growth counties include Alameda County, which absorbed 173,803 new residents; Contra Costa County, which grew by 147,352 new residents; and Solano County, which added 105,218 new residents. The counties of Sonoma, San Mateo, and San Francisco also experienced significant population growth. Sonoma County's population expanded by 88,541; San Mateo County increased by 62,294; and San Francisco County increased by 44,985 residents. The least amount of growth occurred in the counties of Napa and Marin. Napa County's population increased by only 11,566 persons, and Marin County increased by 7,528 persons.

The most rapid population growth in the Bay Area occurred in Solano County, which increased by 44.7 percent between 1980 and 1990, substantially exceeding California's population growth rate. Population growth in Sonoma County and Contra Costa County grew more slowly than the statewide average, but exceeded the Bay Area growth rate. Sonoma County grew by 29.5 percent and Contra Costa County grew by 22.4 percent between 1980 and 1990. The remaining counties grew more slowly than the Bay Area growth rate of 16.3 percent. Alameda County grew 15.7 percent, Santa Clara County 15.6 percent, Napa County 11.7 percent, San Mateo County 10.6 percent, and San Francisco County grew by 6.6 percent. Marin County grew by a very slow rate of 3.4 percent.

Ethnic Characteristics

There are differences between the racial and ethnic population mix of California and the Bay Area.[2] The Bay Area has a much smaller Hispanic population than does the rest California: 15.3 percent for the Bay Area as compared to 25.8 percent for the entire State. In contrast, the Bay Area has a larger proportion of Asian and Pacific Islanders than does all of California: 14.7 percent for the Bay Area as compared to 9.1 percent for all of California. The remaining ethnic mix in the Bay Area is essentially similar to that in the State. Whites comprise 60.7 percent of the Bay Area's population and 57.2 percent of California's population. Blacks comprise 8.6 percent of the Bay Area's population and 7 percent of California's population. Other races comprise 0.7 percent of the Bay Area's population and 0.8 percent of California's population.

Solano and Contra Costa County's racial mix most closely resembles that of the Bay Area. Solano County has a slightly higher black population (12.9 percent compared to 8.6 percent) and a slightly lower Asian population (11.9 percent compared to 14.7 percent) than the regional norm. Blacks comprise 9.1 percent of the population which is close to the regional norm. Asian and Pacific Islanders account for only 9.2 percent and Hispanics account for 11.4 percent which is slightly below the regional norm. Whites comprise 69.7 percent of Contra Costa County's population, which is slightly above the regional norm.

The counties of Marin, Napa, and Sonoma are characterized by less racial diversity: Marin County is 84.6 percent white, Sonoma County is 84.3 percent white, and Napa County is 80.8 percent white. Only 3.3 percent of Marin County's population is black, 3.9 percent is Asian, and 7.8

percent is Hispanic. The Hispanic population in Napa and Sonoma amounts to 14.4 percent and 10.6 percent, respectively, which more closely resembles the regional average. Only 1.1 percent of Napa County's population is black, and 3.1 percent is made up of Asian and Pacific Islander. Only 1.4 percent of Sonoma County's population is black, and 2.6 percent are Asian and Pacific Islander.

The counties of San Mateo and Santa Clara are characterized by their high percentage of Asian and Pacific Islander population. Asians and Pacific Islanders account for 16.2 percent of San Mateo County's population. San Mateo County has 5.2 percent black population which is below the regional average; 60.4 percent is white; and 17.6 percent is Hispanic. Santa Clara County has 3.5 percent black, 58.1 percent white, and 21 percent Hispanic.

Alameda County is characterized by a relatively high percentage black population: 17.4 percent of Alameda County's population is black, compared to 8.6 percent in the region. Alameda County has a lower percentage of whites, accounting for 53.2 percent of the total.

San Francisco County has the most racial and ethnic diversity in the Bay Area. Whites are a minority in San Francisco, accounting for 46.6 percent of the total population. San Francisco also has a very large Asian population, which amounts to 28.4 percent. Blacks comprise 10.5 percent, and Hispanics comprise 13.9 percent of the total population.

Household Size

The average number of persons in each household declined from 2.57 persons per household in 1980 to 2.54 persons per household in 1990. The greatest declines in household size occurred in Marin, Napa, and Contra Costa Counties. Marin County had 2.43 persons per household in 1980, which declined to 2.29 persons per household by 1990. Napa County had 2.55 persons per household in 1980, which declined to 2.45 persons per household by 1990. Contra Costa County had 2.69 persons per household in 1980, which declined to 2.57 persons per household by 1990. San Francisco is the only area that experienced an increase in household size. San Francisco County had 2.19 persons per household in 1980, which increased to 2.27 persons per household by 1990.

Income Characteristics

The results of the 1990 economic census have not yet been published, but the 1980 census data showed the Bay Area's mean household income data to be $39,736 (1988 dollars).[3] Marin, San Mateo, Santa Clara, and Contra Costa Counties all had higher mean household incomes than the regional average.

The region experienced a real growth in income of 14 percent between 1980 and 1988, but this was due as much to increase labor force participation as to growth in income per worker (43 percent to 45 percent, respectively). Growth in investment income accounted to 12 percent. Real income per employee is actually below 1972 levels due to "the combined factors of a highly competitive international market in the 1980s and the destructive inflation of the late 1970s."[4] Since 1980, real income has been increasing. ABAG data projects a nine percent increase in mean household income by 1990, with Santa Clara County enjoying a 20.1 percent increase.

The poverty level is defined in terms of income scaled to the number of persons in the family. For the 1980 census, using 1979 income data from the Office of Management and Budget, the poverty level for a family of four was defined as $7,412. Data from the 1980 census show much less poverty in the Bay Area than in the remainder of California. In 1980 only 7.5 percent of the Bay Area's population was living in poverty, while 11.6 percent of California's population was living in poverty.[5]

The counties of Alameda (11 percent), Sonoma (9.3 percent), Solano (9.1 percent), and Napa (7.7 percent) all had poverty rates higher than the regional average but below California's poverty rate. Contra Costa (7.5 percent), Santa Clara (7 percent), Marin (6.7 percent), and San Mateo (6 percent) Counties all have poverty rates below the regional average. San Francisco's 1980 poverty rate was 2.8 percent.

Employment

Bay Area population growth has been accompanied by a significant growth in jobs. Following the effects of a nationwide recession in 1980-82, the region's economy recovered strongly in 1983-84, finally settling into a slower, but generally positive, pace for the remainder of the 1980s. Currently, it is estimated that Bay Area employers provide nearly 3.1 million jobs, an increase

during the past decade of 538,125 jobs. The employment growth rate during this period was about 21 percent, somewhat lower than the 35.6 percent rate posted by the State as a whole.[6]

Well over half of this growth occurred in the retail trade and service industries, which together contributed just under 360,000 jobs. Transportation services, instrument manufacturing, petroleum refining, and construction businesses also showed strong gains locally. The region's manufacturing and wholesale firms provided an additional 75,570 jobs during the 1980-1990 period. In spite of an industry recession in 1985-87, growth in the region's high-tech industries, including electronics, computers, and office, research and systems control equipment has outpaced other manufacturing industries. In 1990, it is estimated that high-tech industries provided about 54 percent of the region's manufacturing jobs, compared to 48 percent in 1980. Primary metals manufacturers on the other hand lost nearly half of their employees between 1978 and 1988 and fabricated metal products cut employment by nearly a third.[7] Other sectors losing employment in the past ten years include paper and food products.

Within the Bay Area, Santa Clara, San Francisco and Alameda counties have been major sources of regional employment, providing just under 70 percent of all jobs in 1980. This pattern of concentration appears to have shifted somewhat in the past decade, with Alameda and San Francisco counties declining in their relative share of employment. Santa Clara County continued to grow substantially; however, job centers are generally becoming more dispersed. Additional centers of job growth include Contra Costa County, where jobs registered a 45 percent, or 91,500-job, increase by the end of the decade; and San Mateo, with a 17 percent, or 43,000-job, increase. In contrast, although San Francisco remains a center of employment, job growth in this County has been relatively modest, estimated at 4.8 percent from 1980 to 1990.

Similar to the poverty indicators, 1988 unemployment in the Bay Area (4.2 percent) was lower than in the remainder of California (5.3 percent). Solano (5.9 percent), Sonoma (4.7 percent), Napa (4.6 percent), Contra Costa (4.6 percent) and San Francisco (4.5 percent) Counties all have higher unemployment rates than the regional average. Santa Clara (3.9 percent), Marin (3 percent), and San Mateo (2.8 percent) Counties all have a lower unemployment rate than the regional average. Only Solano County's unemployment is higher than California's rate.

Employment by Business Sector

The services sector is the largest employer in the Bay Area, as is true for the State as a whole. Such businesses include personal services, such as hair dressers, laundries and shoe repair shops; and business services such as computer processing, cleaning and maintenance services, and professional services such as accountants, lawyers and doctors. Such businesses provide nearly one-quarter of the jobs in the region. Manufacturing firms provide about 17 percent of total jobs, while retail businesses employ nearly 16 percent of all workers. Government is the fourth largest major sector employer in the region with about 15 percent of all non-agricultural employment.

The electronic machinery sector comprises about 25 percent of manufacturing employment, with another 9.5 percent in instrument manufacturing, reflecting the predominance of Silicon Valley businesses in the local economy. Between 1978 and 1988, the electronics firms statewide suffered a net employment reduction of five percent, while similar firms in the Bay Area posted a 44 percent employment increase. However, in recent years these industries have experienced difficulties in the Bay Area as well. The period of employment growth in these industries really concluded in 1985. Between 1985 and 1988, high technology industries lost nearly 10,000 jobs.[8] The shakeout in this sector has continued to the present, although firms with highly specialized product niches continue to do well.

Transportation equipment manufacturing and other industrial machinery are also strong sectors in the region. The Bay Area also has a relatively high share of statewide employment in chemicals manufacturing and petroleum refining. Both of these industries would be directly affected by the CAP control measures. Construction firms employ about five percent of Bay Area workers.

Housing

The 1990 Census indicates that the Bay Area experienced a 20 percent growth in households since 1980. This is about 4 percent, or 81,000 units, higher than ABAG had projected. Solano, Sonoma and Contra Costa counties experienced the highest growth rates during this period, but the greatest amount of growth occurred in Santa Clara and Alameda counties. These two counties contributed about 40 percent of all housing growth in the region, or nearly 160,000 new units.

Despite the strong growth in Alameda and Santa Clara, ABAG projects there will be an unmet housing need of about 16,850 units between 1990 and 1995 due to continued job growth in these counties.[9] San Francisco is estimated to have an additional 7,360 unit shortfall during this period. Contra Costa, Napa, Solano and Sonoma Counties are all projected to experience excess housing development in relation to job growth. The issues associated with labor force and job location patterns are discussed later in this section.

The Bay Area has experienced extremely high housing costs for a number of years, due in part to the lag in housing production in relation to job growth. ABAG estimates that only 13 percent of Bay Area residents meet lending criteria to buy a median priced home in the area.[10]

Projected Growth in the San Francisco Bay Region

In general, growth in the San Francisco Bay Region is expected to proceed at a slower pace in the 1990-2005 period than in the preceding decade. Although still positive, projected average annual growth rates for population, labor force and jobs are all expected to be below those experienced between 1980 and 1990. By 2005, the Bay Area will add another 856,100 residents to achieve a total household population of 6.6 million.[11] Although substantial in absolute terms, this increase translates into an annual increase of only about one percent. Household growth will also gradually slow from the 1980-1990 rate of 1.6 percent per year to 1.2 percent per year between 1990-2005. Within the Bay Area, the following five counties are projected to produce a 1990-2005 population growth in excess of 100,000: Santa Clara (+188,550), Alameda (+164,200), Contra Costa (+154,750), Solano (+127,600), and Sonoma (+104,250).

The projections indicate that employers in the region will provide an additional 880,880 jobs, reaching a total of nearly four million by 2005. This represents a slight reduction in the rate of growth between 1980 and 1990. From 1980 to 1990, the number of Bay Area jobs increased at an annual rate of 1.9 percent, compared to the projected rate of 1.7 percent from 1990 to 2005. Major sources of anticipated growth through 2005 include the service industries (+368,180 jobs), retail trade (+175,420), and manufacturing (+162,330). Within the manufacturing sector, high-tech industries are expected to be the major source of additional growth, providing about 77 percent of all new manufacturing jobs during the next 15 years. By 2005, these industries will provide 60 percent of all Bay Area manufacturing jobs.

Projected job growth through 2005 is heavily concentrated in Alameda County (+174,870) and Santa Clara County (+264,240). Together, these two counties are expected to produce about half of the region's total job expansion between 1990 and 2005.

<u>Labor Force and Jobs/Housing Balance Issues</u>

ABAG projection data indicate that in 1990 there were 3,276,700 persons in the regional labor force, of which 3,162,800 were employed. This suggests that some 113,900 people, or 3.5 percent of the labor force, were unemployed. This is below the State Employment Development Department estimate of 4.2 percent for 1988, as discussed above. At the same time, the region provided 3,073,280 jobs, implying that a net total of 89,520 Bay Area workers were commuting outside the region to work. This situation is projected to change dramatically over the next 15 years. Due to changes in the labor force participation rate (i.e., the percentage of persons between the ages of 15 and 65 who are actually employed or seeking work) and the decreasing availability of sites for new housing development, the predominant trend, if projected, will be to see substantial commuting *into* the Bay Area. Despite the current overall net export of regional labor, inbound commuting has already increased dramatically due to the lack of affordable housing in proximity to regional job centers. Within the region, significant imbalances between labor force and jobs exist, creating long commutes and attendant traffic congestion and air pollution.

From a planning perspective, it is ideal to have a reasonable match between the size of the employed labor force and the number of jobs available within the major cities and subregions in the region. Although the normal diversity in individual residential and job preferences will mean that some workers will always choose to work away from their town of residence, a reasonable balance permits workers who wish to reduce their commute (and lessen their contribution to regional traffic congestion) the option to do so. Since the opportunity to live near one's workplace is closely tied to the availability of housing opportunities, this issue is frequently expressed in terms of jobs/housing ratios. However, it is important to note that a 1:1 correspondence between housing units and jobs in a community is not the desired balance because frequently more than one worker resides in a house. On the average in the Bay Area, there are 1.4 workers per household. On this basis, then, the ideal balance would be 1.4 jobs per housing unit. ABAG has further refined

this notion for its fair share housing needs analysis to reflect existing land use patterns, so that a 1:1 correspondence between jobs and workers is not required in each community.

As mentioned, the supply of labor in the region is projected to decrease markedly in relation to the projected job growth over the next 15 years. ABAG projects that the labor force participation rate will begin to level off due to aging of the regional population. It is estimated that the participation rate will level off at about 71 percent by 1995, up from the current figure of 69.3 percent, and then begin the decline. At the same time, a basic imbalance in development potential between residential and non-residential land uses suggests that the labor supply may not keep up with job growth. Over the next 15 years, the number of employed residents in the region is expected to grow by 588,800 individuals, while the number of jobs is expected to increase by 880,900. By 2005, the total number of jobs provided by regional employers is expected to exceed the number of employed residents by 202,560.

Comparing projected growth in the number of employed residents and job growth by county suggests substantial interregional commuting. By 2005, the number of jobs provided by employers in Santa Clara and San Francisco counties will exceed the projected number of employed residents by nearly 450,000, indicating substantial in-commuting of workers from surrounding regions.

In addition to the impacts on transportation facilities, ABAG suggests that "as labor supply growth slows or stops, labor costs will be affected, if demand remains fixed. If trends continue, the 1990s in the Bay Area probably will be characterized by labor shortages causing inflationary pressures on wage and salary compensation which will affect long term job growth. Furthermore, if the economy remains strong, slower labor force growth could result in higher productivity and a strengthening of real income."[12]

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

Many of the control measures affect business and industry directly by requiring shifts to new types of equipment, new industrial processes or chemical substances, and changes in transportation equipment or practices. Some of these impacts may result in changes in employment and the prices

of products manufactured by the affected industries. These kinds of effects will impact workers and consumers directly.

Some of the measures related to indirect source review and zoning and design policies may affect the distribution of population, employment or housing growth. This could have physical environmental effects depending on the ways in which land use patterns change. These issues are addressed below where appropriate, and the reader will find additional discussion and greater focus on planning issues in the Land Use Section of this EIR.

Finally, the construction of substantial improvements to the transit and freeway system in the region would have positive benefits for employment, both in the construction industry and in transit agencies for construction, operation and maintenance of the expanded systems.

Standards of Significance

The CEQA Guidelines indicate that a project will normally have a significant population impact if it will induce substantial growth or concentration of population and/or employment. For the purposes of this Draft EIR, growth in population, employment or housing beyond that which can be accommodated is considered a significant adverse impact. Identification of what level of growth can be accommodated will be judged against ABAG Projections. An increase in population, employment or housing in excess of the ABAG Projections resulting from implementation of the CAP will be considered a significant impact.

Mobile Source Control Measures

Impacts from Employer-Based Trip Reduction Measures

Impact

4.4-1 **TCMs 1 and 2 would result in the employment of transit coordinators, by government agencies and private employers. This would be a beneficial effect.**

It is estimated that employment of transit coordinators could cost the private sector $150 million per year (1990 dollars).[13] Implementing agencies (the BAAQMD and local governments) would spend an additional $5.2 million annually on the program. Whether all employers could afford to hire transit coordinators and bear other program costs without cutting employment costs elsewhere

is unclear. Revenues from employee parking charges would potentially far exceed the program costs even after any rebates to economically disadvantaged employees. However, the parking charges are not mandatory until Phase 3 of the CAP. In the early phases, certain employers may choose to fund the program without increasing costs to their employees. Presumably, these employers would decide that the program costs are not significant enough to affect their normal operations.

Mitigation Measure

4.4-1 *None recommended or required.*

Impact

4.4-2 **TCMs 1 and 2 may contribute marginal pressure toward a redistribution of housing value, increasing values in proximity to transit facilities and reducing values at other housing locations. This would be a less than significant effect.**

Mitigation Measure

4.4-2 *None recommended or required.*

Impacts from Mobility Improvements

Impact

4.4-3 **Construction projects to implement the mobility improvements would create additional employment in construction industries. This would be a beneficial impact.**

It is estimated that construction employment generated by the mobility improvements would be about 250,000 person years. If the construction program takes ten years, this would create about 25,000 construction jobs during this period.[14]

Mitigation Measure

4.4-3 *None recommended or required.*

<u>Impact</u>

4.4-4 **Expanded bus and rail transit operations will provide new jobs for vehicle operators, maintenance workers and administrative personnel. This would be a beneficial impact.**

It is projected that regional transit ridership will increase as a result of the program of improvements. The effect of this expanded service on employment will vary with each transit agency depending on their current growth capacity and operational considerations.

<u>Mitigation Measure</u>

4.4-4 *None recommended or required.*

<u>Impact</u>

4.4-5 **Mobility measures should have largely positive effects on business, including reduced costs of goods transportation due to improved road conditions. This may counteract the increased costs and associated employment impacts of other air quality rules. This would be a beneficial impact.**

Businesses most affected by improved freeway and road operations are those in the transportation and distribution sectors. Employment in these sectors was estimated to be 188,000, or 6.5 percent of Bay Area employment, in 1988.[15] However, most all businesses, including manufacturing as well as service firms, are dependent on road transportation for delivery of supplies, products, and customers. For example, MTC estimates that the RTP will increase sales and employment in retail and service business by 17 percent, resulting in nearly 14,000 new jobs.[16]

<u>Mitigation Measure</u>

4.4-5 *None recommended or required.*

Housing Impacts

<u>Impact</u>

4.4-6 **Increased transit efficiency may contribute marginal pressure toward a redistribution of housing value, increasing values in proximity to transit**

facilities and reducing values at other housing locations. This would be a less than significant effect.

Mitigation Measure

4.4-6 *None recommended or required.*

Impacts from Indirect Source Review Measures

Impact

4.4-7 **Indirect Source Review may increase development costs in certain locations and alter the distribution of employment over the long term. This would be a less than significant impact.**

Phase 1 includes an indirect source review rule that could affect the cost to business of locating in certain communities or in certain kinds of developments. The specific measures that might be applied to implement the rule include a variety of site design and amenity approaches (e.g., sidewalks, bicycle lanes and transit pull-outs) that would increase the cost of development and construction of new buildings. This may have an inflationary effect on building lease costs.

In the short term, the current oversupply of developed commercial properties would cushion this effect. Over the long term, regional surplus of non-residential land would also dampen adverse impacts. ABAG projects a general shortage of housing in the region compared to the potential for job growth. This job growth projection is based on regional market forces and economic demand generated through local, statewide and national economy. The economic demand is projected to use only a fraction of the land zoned for non-residential uses. On the other hand, housing development is severely constrained by the availability of suitable sites. Indeed, in order to meet the ABAG job growth projections, it will be necessary for areas outside the region, including Santa Cruz, Yolo, San Joaquin and other counties, to absorb the housing demand to support a sufficient labor force. The upshot of this situation is that any inflationary effects of the indirect source review rule on business locations would be mitigated by the surplus availability of sites in the region.

Mitigation Measure

4.4-7 *None recommended or required.*

Impact

4.4-8 **Indirect Source Review may affect the availability, affordability and location of housing. This would be a less than significant impact.**

Please refer to the discussion of housing impacts under Implementation Support Programs below for a discussion of housing location issues related to transit facilities.

Mitigation Measure

4.4-8 *None recommended or required.*

Implementation Support Measures

Impact

4.4-9 **TCM 18, which would encourage high-density development and transit-oriented design in proximity to transit stations and facilities, may affect the location and availability of housing choices. It is likely, though, that this measure would increase the stock of affordable housing, and increase the efficiency and reduce the cost of transit for those who live closer to the stations. This would be a beneficial impact.**

This measure is in the nature of an advisory program to encourage local government to consider alternative land use and design policies that would encourage increased transit use. Its effectiveness depends on the response of local planning agencies and cannot be predicted with certainty. However, as an illustration of the potential for local land use policy change, ABAG recently conducted an analysis addressing similar issues.[17] The effort focused on shifting the mix of future residential and employment generating uses within transit sensitive corridors so that larger populations obtain transit access for commute trips. The report notes that in 1985 there were 71,200 acres of land available for commercial and industrial development in the region, But the amount needed to meet employment growth projections between 1990 and 2010 is only 21,000 acres, meaning that there is a sizable surplus of non-residentially zoned land in the Bay Area. By shifting some of this land located in transit sensitive areas to residential uses, ABAG suggests that the total housing production could be increased by 163,940 units, or nearly six percent of the housing inventory currently projected to be available in 2010. ABAG projects that housing demand

would be strong enough to absorb these additional units, and that the effect of the land use changes would not simply be a shift in housing development locations. Alameda and Santa Clara Counties would experience the highest acreage shifts from commercial to residential uses.

Mitigation Measure

4.4-9 *None recommended or required.*

Impact

4.4-10 **TCM 18 would also increase the population and labor force in the region. According to the CEQA Guidelines, this would be a significant impact.**

Based on the increased housing production discussed above, and assuming it is correct that this would represent new housing growth rather than simply a shift in location, the alternate land use pattern evaluated by ABAG could increase population in the region by 403,300 by 2010.[18] Of this total, about 227,200 persons would be expected to be actively employed. TCM 18 would reduce the number of workers that areas outside the region (e.g., San Joaquin, Santa Cruz counties) would have to house in order to support employment growth in the Bay Area.

Mitigation Measure

4.4-10 *None available.*

Market-Based Transportation Control Measures

Impact

4.4-11 **The increased costs of transportation due to the market-based measures would have broad repercussions in the regional economy, possibly resulting in lower employment growth. This would be a significant impact.**

Increased vehicle registration fees, gas taxes, bridge tolls, among other market-based measures, could increase annual business costs in the region by nearly $2 billion. Although other benefits of the CAP such as reduced travel times, increased worker productivity, and increased employment in certain transportation and manufacturing sectors help to mitigate this effect, it is likely a residual cost impact will occur. This impact may offset other employment gains, such as the 14,000 jobs

MTC estimates will be added in the retail and services sectors due to improved regional transportation capacity.

Mitigation Measure

4.4-11 *The District should consider whether certain types of businesses, providing essential transportation services and for whom other goods or people movement alternatives are not feasible, should be exempted from the market-based revenue measures. This would be a significant and unavoidable impact.*

Stationary Source Control Measures

Impact

4.4-12 **The proposed stationary source control measures would increase costs for many industries and businesses in the region. In some cases, these costs may result in reduced employment or slower employment growth. It is estimated that the maximum direct employment loss associated with these measures would be 1,750 manufacturing jobs and 410 in other employment sectors. These direct job losses would in turn result in employment decreases in supporting industries and businesses. It is estimated the maximum indirect and induced employment loss would be another 8,970 jobs for a total job impact of 11,130. This would be a significant impact.**

These proposed control measures concern stationary sources of air pollution, including surface coatings, adhesives and solvents used by industry and households; petroleum and organic liquid storage and distribution; refinery and chemical plant processes; and other industrial and commercial processes. In general, these measures would require industry to lower emissions by purchasing pollution abatement equipment, altering their production processes, or using lower-emission materials in the production of goods and services. Assuming full implementation without regard to phasing, the combined known compliance cost for all proposed stationary source control measures is estimated to range from a minimum of $292.1 million to a maximum of $339.8 million per year (1990 dollars).[19] These estimates include operating and maintenance costs, as well as amortized capital expenditures.

To the degree that Bay Area firms are successful in passing along compliance costs to their customers, the resulting price increases would contribute to the region's rate of inflation. In addition, higher prices may result in some decline in demand for the firm's product, causing industry

output and employment to fall. Firms that must absorb all or a major part of the additional costs would suffer a decrease in profits, resulting in further declines in production and employment. The impact of the proposed control measures would most likely be greatest for two groups of industries: those experiencing the largest absolute increase in costs and those for which compliance costs as a percent of the value of output are highest. According to these criteria, the following industries are likely to experience the greatest impact from implementation of the proposed control measures: electric, gas and sanitary services; petroleum refineries; eating/drinking establishments; transportation equipment; stone, clay, glass and concrete; and chemicals and allied products. The employment losses discussed above would occur mainly in these industries, with the exception of the electric and gas industry. The impact to PG&E in particular is not projected to result in direct employment losses, although the cost of compliance would be substantial. Analysis of the costs suggests that the company would be able to pass them on to ratepayers without significant adverse financial impacts to consumers.

Secondary Employment Impacts. The primary employment impacts resulting from adoption of the proposed stationary control measures will also have secondary impacts on the general level of economic activity in the Bay Area. It is estimated that the 2,160 direct job loss will engender further losses in indirect and induced jobs of 8,970 throughout the region.[20]

The employment impacts would be partially mitigated by the fact that the proposed measures may also have selected positive affects on regional suppliers of equipment, machinery and other products required for compliance. As an example, several of the proposed coatings measures require the use of more efficient application equipment and procedures, with the result that producers of such equipment are likely to experience an increase in demand. To the degree that these products are manufactured in the Bay Area, this increased demand will have a positive, offsetting impact on output and employment in these industries. Similarly, nearly 90 percent of the costs to the petroleum industry is for additional capital equipment. To the extent this equipment can be provided locally, the employment impacts can be neutralized. Current information is not adequate to identify the region's ability to satisfy local demand for compliance equipment and supplies.

Mitigation Measure

4.4-12 *None available.*

Impact

4.4-13 **Rule F1 requiring the review of new emission sources may affect the location of new employment generating uses. This would be a less than significant impact.**

The proposed Rule F1 would lower existing emission thresholds affecting firms wishing to develop new facilities in the Bay Area. This means that more firms would be required to offset any increased emissions associated with the new development by decreasing emissions at existing facilities than is the case under the current thresholds. Firms with no existing facilities in the Bay Area can accomplish this by purchasing "banked emissions" or paying other, unrelated firms to adopt abatement technologies reducing current emissions by the required amount.[21] Firms with facilities in the Bay Area may use the same approach to reduce existing emissions at their own facilities or at those of other firms. Although this requirement makes it more expensive for firms to move into or expand in the Bay Area, it does permit additional growth to occur.

Mitigation Measure

4.4-13 *None recommended or required.*

Impact

4.4-14 **Increased costs for architectural coatings and adhesives will likely be passed on to household and industry, particularly construction firms. This may increase the cost of housing construction; however, since the total cost to the industry is less than one percent (0.2 percent) of all construction output in the region, it is unlikely will be noticeable in relation to the general housing price inflation in the region. This would be a less than significant impact.**

Mitigation Measure

4.4-14 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Transportation Control Measures

Construction and operation of the expanded transit system will create employment opportunities. Cumulatively, the regional economy is projected to experience strong employment growth, increasing by 880,880 jobs between 1990 and 2005. The primary long-term issues related to this employment growth is whether housing production can keep pace to support sufficient growth of the labor force.

TCM 18, and possibly the Indirect Source Review Rule (TCM 19), could address this cumulative housing shortage if they result in local land use policies that encourage increased housing opportunities, particularly in proximity to transit facilities. ABAG suggests that shifts in land use designations could increase housing production by 163,940 units, or about six percent of the housing stock projected for 2010. The increased units could have cumulative impacts on local public services; however, their location in established transit corridors and their density characteristics should permit maximum efficiency in service provision and thus minimize such impacts.

This increased housing production would add some 403,300 people to the Bay Area population, again about six percent of the total projection for 2010. This growth would have positive effects on the regional transportation system, with minimal local service impacts.

Stationary Source Control Measures

The increased costs of compliance imposed on business by stationary source control measures are estimated to result in about 2,160 fewer permanent jobs in the Bay Area. The multiplier effects of this job loss could increase the total impact to 11,130 jobs. This represents nearly one percent of the projected job growth between 1990 and 2005, but it is likely to be less than the positive employment benefits of the TCMs. It is also anticipated that some portion of this adverse impact can be mitigated through increased production in firms supplying required technology or products needed to gain compliance with the control measures. Regional economic development initiatives should include consideration of this business opportunity. No further mitigation is required or recommended.

1. The 1980-1990 population comparison is based on recently released Census data, published by the State Department of Finance, Report C90-PL-1, Table 2. The ABAG projections for this period show a 771,161 increase in population, or about eight percent below actual growth.

2. Department of Finance, op cit., Table 1.

3. ABAG, Projections 90. Figures are shown in 1988 dollars.

4. Raymond J. Brady, San Francisco Bay Area Economy: Shifting Structure and Growth, Working paper 89-1, ABAG, Oakland, June 1989. p. 16.

5. California State Office of Economic Opportunity, The Status of Poverty in California 1983-84, Sacramento, n.d.

6. State growth rate based on 1978-1988 data as reported by the State Employment Development Department.

7. California Employment Development Department, Annual Planning Information Reports, Bay Area Counties, 1990.

8. Brady 1989, op cit., p. 6.

9. ABAG, Residential Demand and Development Potential in the San Francisco Bay Region -- Options to Accommodate Residential Growth, Working Paper 91-1, Oakland. January 1991. p. 15.

10. Ibid., p. 17.

11. Based on ABAG Projections 90 data. Total growth may have to be adjusted to reflect 1990 census data.

12. Brady 1989, op cit., p. 10.

13. Greig Harvey, Cost Assumptions for State Transportation Control Measures, DHS Associates, unpublished.

14. Applied Development Economics, Socioeconomic Report for the 1991 Bay Area Clean Air Plan, June 1991.

15. State Employment Development Department. Includes motor freight transportation and warehousing, transportation services and wholesale trade.

16. MTC, op cit. p. 15.35.

17. ABAG, Increasing Transit Ridership and the Efficiency of land Use While Maximizing Economic Potential; Working paper 90-2, October 1990.

18. Based on the average household size of 2.46 estimated by ABAG for the year 2005. Year 2010 estimates area not available.

19. Applied Development Economics, Socioeconomic Report for the 1991 Bay Area Clean Air Plan, June 1991.

20. Estimate prepared by ADE based on employment multipliers provided in: ABAG, 1982 Input-Output Model and Economic Multipliers for the San Francisco Bay Region, 1988 Update, November 1988.

21. Banked emissions represent a share of emission reductions undertaken by a firm in advance of the implementation of a control measure requiring the reduction. A firm is usually allowed to bank 25 percent of total reductions undertaken prior to measure implementation.

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4.5 PUBLIC HEALTH AND SAFETY

This section discusses the known health effects of some air pollutants of concern with respect to the proposed project and qualitatively examines the potential health effects of the project itself. In addition, this section describes other potential health and safety impacts of the project including risk of upset and effects on emergency plans.

SETTING

It is generally acknowledged that air pollution affects human health. However, it is difficult to isolate air pollution's health effect from other causes and to determine the precise degree of harm it causes.[1] A United States Public Health Service publication states: ". . . air pollution, as it exists in some of our communities, contributes significantly as a cause or aggravation factor for the following medical conditions: acute respiratory infections, chronic bronchitis, chronic constrictive ventilatory disease, pulmonary emphysema, bronchial asthma, and lung cancer."[2] The actual effects of exposure to air pollutants depend on several factors including pollutant concentrations, exposure duration and frequency, the potency of the pollutants and other factors.

Background and Regulatory Framework

Air quality standards define the amount of various types of pollutants in the air that distinguish between clean air and dirty air. Air quality standards are designed to protect public health and welfare in several broad ways:

- to protect the most sensitive members of the population from chronic and acute health effects, particularly the causation or aggravation of chronic cardio-pulmonary diseases including bronchitis, emphysema, asthma and restrictive ventilatory disease; and

- to protect the population at large from adverse but transitory effects including irritation of eyes and respiratory tract, headaches, chest pains and coughing.[3]

The most important reason for establishing and maintaining air quality standards is the likelihood of adverse health effect to the most sensitive members of the population if they are exposed to high concentrations of air pollutants. The term "sensitive receptors" can refer both to the population groups concerned and to the facilities, such as schools, hospitals and convalescent homes, where such groups are likely to reside or spend a substantial amount of time. Sensitive receptor groups include children, the elderly, the acutely ill, and the chronically ill, especially those

with cardio-respiratory diseases. Acceptable air pollutant concentration levels are based on the best scientific evidence available, and usually include a safety margin because of the uncertainties involved. If these levels are met, eye and throat irritation -- and more serious health effects -- will not appear among even the most sensitive members of the public.[4]

The California Air Resources Board (ARB) has adopted air quality standards based on the recommendations of the State Department of Health Services. According to the California Clean Air Act of 1988, attainment of these health-based standards is necessary to protect public health.[5] The following information concerns the health effects of some air pollutants regulated under the California Clean Air Act and the corresponding State air quality standards for these pollutants.

Air Pollutants Regulated Under the CCAA

The following discussion concerns "criteria" pollutants regulated under the CCAA. Although sulfur dioxide (SO_2) is addressed under the CCAA, the Bay Area is in attainment for this pollutant, and the CAP does not include SO_2 control measures. Correspondingly, this section does not contain a discussion of the health effects of SO_2 exposure.

Carbon monoxide. This is an odorless, invisible gas that, in high concentration, affects human health. Carbon monoxide (CO) is especially dangerous when emitted indoors where there is inadequate ventilation, as the gas can act as a chemical asphyxiant. Other adverse health effects of CO exposure include: impairment of oxygen transport in the bloodstream, and increase of carboxyhemoglobin (COHb) in the blood; aggravation of cardiovascular disease; and impairment of central nervous system functions.[6] The normal concentration of COHb in the blood of nonsmokers is about 0.5 percent.[7] At COHb levels of 2.5 percent resulting from about 90-minute exposure to about 50 parts per million (ppm) CO, impaired time perception may occur; at approximately 5 percent COHb there is an impairment of other faculties which involve both motor and psychological components. If exposure is high enough, headaches, dizziness, unconsciousness and death can result from CO exposure.

It should be noted that ambient (outdoor) air levels of CO in the Bay Area have rarely exceeded federal Ambient Air Quality Standards. The State standard for CO concentration, averaged over an 8-hour period of time, is 9.0 ppm, or 10 milligrams per cubic meter (mg/m^3), while the standard

for a 1-hour averaging period is 20 ppm (23 mg/m^3). The CO standards are intended to prevent carboxyhemoglobin levels in the blood greater than two percent, and to protect persons whose medical condition already compromises their circulatory system's ability to deliver oxygen.

Oxides of Nitrogen. Nitrogen dioxide (NO_2) is a brown-colored gas seen as a "whiskey brown" haze at concentrations experienced in the Bay Area. The major adverse effect of NO_2 exposure is risk of acute and chronic respiratory disease. The physiological effects of NO_2 are generally similar to those of ozone. The predominant effect is more rapid breathing, with a decrease in breathing efficiency.[8] Further, sustained exposure to high levels can cause pulmonary changes in experimental animals. For example, animal experiments suggest that either short-term or long-term exposures to NO_2 can increase susceptibility to respiratory infection by bacterial pneumonia or influenza virus.

The State standard for NO_2 concentration, averaged over a 1-hour period of time, is 0.25 ppm, or 470 micrograms per cubic meter ($\mu g/m^3$). The primary objective of this standard is to prevent impaired respiratory function.

Ozone. This gas comprises the largest fraction of photochemical smog. The major health effects of "oxidants," the term used to describe photochemical products such as photochemical ozone, are respiratory diseases and eye irritation. Exposure to ozone produces alterations in respiration, the most characteristic of which are shallow, rapid breathing and lowered breathing efficiency.[9] Studies have indicated that the performance of athletes is impaired by sustained exposure to high concentrations of ozone.[10] Other studies suggest that similar concentrations increase chronic airways resistance in the lungs and diminish the body's resistance to disease. People suffering from the symptoms of emphysema and asthma generally experience more difficulty breathing during periods of high ozone levels.

The State standard for ozone concentration, averaged over a 1-hour period of time, is 0.09 ppm (180 $\mu g/m^3$). The objective of this standard is to prevent eye irritation and breathing difficulties.

Toxic Air Contaminants and Other Air Toxics

In addition to the "criteria" air pollutants discussed above, there are other air pollutants, commonly known as air toxics, which are of concern. Hundreds of compounds, both in the gaseous phase and associated with the particles are present in mobile source emissions. However, for many compounds there is a lack of emissions data and/or health data and/or exposure data which prevents meaningful risk estimates from being examined.[11] The following describes State air toxics regulation and air toxics of importance with respect to the CAP. Methanol, a potential alternative fuel, and electromagnetic fields (EMF) are also described because of their relevance to the project.

In the State of California, some air toxics classify as "toxic air contaminants" (TACs). A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality and serious illness, and may pose a present or potential hazard to human health.[12] TACs are identified under the statutory mandate of AB 1807 as follows. The ARB first prioritizes compounds which may be candidates for listing as TACs. Then, after selecting a particular candidate compound, ARB requests information regarding the health effects of the compound from the public and the California Department of Health Services (DHS). Based on ARB exposure data and the DHS evaluation, the ARB publishes a report, made available for public comment, on the compound, which is then reviewed by an entity known as the Scientific Review Panel (SRP). After review of the findings of the SRP, and conducting a public hearing, the ARB decides whether to list the compound as a TAC.

Of the 14 currently-listed TACs, benzene is of particular concern with respect to the proposed project. However, other substances that relate to the project are being reviewed for identification as TACs. Specifically, these substances are diesel exhaust and formaldehyde. As further discussed below, ammonia is another substance of concern to the proposed project. Ammonia is presently being evaluated for entry in the TAC review process. Factors considered in this evaluation include carcinogenic and noncarcinogenic health effects, emissions and exposure in California.

The following information is provided to acquaint the reader with the nature and known health effects of the substances cited in the preceding paragraph (i.e., benzene, diesel exhaust, formaldehyde and ammonia) and other issues of concern to public health (i.e., other air toxics in mobile source emissions, methanol and EMF) as background to the impacts discussion below.

Benzene. This substance is a hydrocarbon that occurs naturally in crude oil and is formed as the oil is refined into products such as gasoline. It is emitted into the air from the production, marketing and burning of petroleum-based fuels and other combustion processes. Benzene is emitted from vehicles as a part of the exhaust gases as the fuel is burned and with the evaporation of fuels from the fuel system.

Benzene is known to be a human and animal carcinogen. For humans, relatively high doses of benzene cause intoxication, and respiratory and circulatory collapse. Benzene can also act as a central nervous system depressant. In smaller doses, it has been associated epidemiologically with increased incidence of leukemia, and animal studies have shown that it causes a variety of other cancers as well. Because it is a carcinogen, benzene is treated as a substance without a threshold below which it can be considered safe.[13]

Diesel exhaust. Exhaust from diesel-powered vehicles contains a relatively high particle content. Diesel exhaust particles are small, and they readily deposit in the respiratory tract when inhaled. There are two concerns related to inhaling high concentrations of such particles. First, they may cause respiratory functional changes and increased susceptibility to infections because of their toxic properties. Symptoms of acute exposure to high levels (i.e., above ambient) of diesel exhaust include mucous membrane and eye irritation, headache, light-headedness, nausea, vomiting, heartburn, weakness, numbness and tingling in extremities, chest tightness, and wheezing. They may also increase the risk of developing respiratory tract cancers because the contain mutagenic and carcinogenic chemical compounds similar to the organic compounds associated with cigarette smoke, coke oven emissions and roofing tar vapors.[14] Specifically, polycyclic aromatic hydrocarbons (PAH) are adsorbed onto the diesel exhaust particles, and several of these are known or potential human carcinogens. PAHs have been nominated for review for identification as TACs.

The U.S. Environmental Protection Agency (EPA) estimates that the annual lung cancer incidence in the U.S. population in 1986 due to diesel exhaust particulate matter ranged from 178 to 860.[15] Because diesel exhaust is regarded as a potential or probable human carcinogen, efforts should be made to reduce exposures to the lowest feasible concentration. Regulation of emissions from diesel-powered vehicles falls under the authority of the EPA's Office of Air and Radiation, Office

of Mobile Sources. In 1991, the diesel exhaust particle standard for urban buses becomes 0.10 grams per brake horsepower-hour.[16]

Formaldehyde. This substance is an exhaust product of methanol (and gasoline and diesel) combustion. With current technology, methanol-fueled vehicles emit relatively large amounts of formaldehyde.

Particles in smog are capable of carrying a considerable amount of formaldehyde. The substance is a primary irritant, particularly of mucous membranes of the nose, upper respiratory tract, and eyes. Although inhalation tests on rats have shown that formaldehyde may induce tumors in the nasopharynx (i.e., the substance is a potential carcinogen), so far there appears to be no documented record of a higher incidence of respiratory tract tumor growth in the many humans exposed to it occupationally or generally.[17]

Ammonia. This substance may be added to post-combustion flue gas as a reducing agent in selective catalytic reduction, a technology which reduces NO_x emissions.

Ammonia gas is a classic example of an irritant gas. The acute effect of ammonia inhalation is immediate upper and lower respiratory tract irritation and edema. The gas is well tolerated in that unless the exposure concentration is sufficient to cause death, the acute effects do not result in chronic residual pulmonary damage.[18]

Other Air Toxics in Mobile Source Emissions. As discussed above, mobile source emissions may contain hundreds of compounds. Of the emissions compounds relating to the CAP and not discussed in the preceding paragraphs, the following are notable for their potential effects on human health: gas phase organics, dioxins, ethylene dibromide (EDB) and cadmium. The following briefly describes these compounds.

Gas phase organics with established risk factors include benzene and formaldehyde (already discussed), benzo(a)pyrene (B(a)P), ethylene and 1,3-butadiene. Both B(a)P and ethylene present low health risks in relation to other air toxics.[19] A 1987 EPA study indicated that the annual mobile source cancer risk (per million urban residents) for 1,3-butadiene could vary between 0 and 3.16.[20] Dioxin, a human carcinogen, has been found in some qualitative analytical measurements

to be present in vehicle muffler scrapings. However, it appears to be emitted in only trace quantities in vehicle exhaust. Finally, EDB and cadmium present negligible risk in comparison to other mobile source pollutants.[21]

Methanol. This alcohol may be added to gasoline as an alternative fuel. Automobiles and other vehicles may also be designed that use "neat" methanol as a fuel.

Methanol is rapidly and well absorbed by inhalation, oral and topical exposure routes. At high doses, methanol can cause reversible or permanent blindness, and in severe cases, death. Much less information is available on the health effects of long-term exposure to low levels of methanol. Further, there is great variability in the human response to methanol ingestion. The case fatality rate for methanol poisoning is about 0.373 percent, 25 times that for gasoline.[22] The American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value (TLV) for methanol is 200 ppm.

Electromagnetic Fields

Although not directly related to air quality, health effects of electromagnetic fields (EMF) may be of indirect concern to the proposed project, due to potential increased use of electric vehicles and electrical systems development. The following brief description of health effects associated with EMF is included to provide a basis for the discussion of EMF-related impacts below.

Wherever there is electric current there are also electric and magnetic fields, which are created by electric charges. In the U.S., ordinary alternating current in appliances, power lines, wiring in buildings, other electrically-powered motors and distribution systems produces 60 Hertz magnetic and electric fields (fields that oscillate 60 times per second). Electric fields, which are usually measured in kilovolts per meter (kV/m), depend on the size of the electric charge. Magnetic fields, which are usually measured in gauss, result from the motion of the charge.

Recent experiments have shown that magnetic fields can cause biologic changes in living tissues. However, it has not been definitively established that there is any risk to human health associated with these changes. Some, but not all, health studies of workers and children have suggested that increased cases of cancer may occur in locations thought to have high magnetic fields. A number

of research studies are now under way to determine with greater certainty if magnetic fields do indeed pose a health risk and, if so, what aspects of exposure to such fields (e.g., duration, intensity of field, etc.) are harmful. With the scientific information now available, it is not possible to set a standard or say that any given exposure level is "safe" or "dangerous."[23]

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

This section evaluates the CAP's potential to affect human health and safety by altering existing levels of risk associated with possible upset conditions or health hazards. The potential impact issues cited above are derived from the Environmental Checklist Form contained in Appendix I of the CEQA Guidelines. Specifically, the following characteristics of the project are examined:

- whether the project will involve: a) a risk of explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions; or b) possible interference with an emergency response plan or an emergency evacuation plan;

- whether the project will result in: a) the creation of any health hazard or potential health hazard (excluding mental health); or b) exposure of people to potential health hazards.

Standards of Significance

The CAP will be considered to have a significant effect on the environment if it will: a) create a potential public health hazard or involve the use, production or disposal of materials which pose a hazard to people or animal or plant populations in the area affected; or b) interfere with emergency response plans or emergency evacuation plans.[24]

Mobile Source Control Measures

General Impacts from Transportation Control Measures

Impact

4.5-1 **Generally, Transportation Control Measures (TCMs) proposed as part of the CAP would reduce the concentrations of CO, NO_2, ozone and benzene present in the region's air, and would consequently reduce an existing potential public health hazard. This effect constitutes a beneficial impact on public health.**

Air quality has recently improved in the region due in part to tailpipe controls on motor vehicles, cleaner fuels and other controls, thereby creating conditions less likely to cause adverse public health effects.[25] Such conditions exist simultaneously with population growth and a changing standard of living in the Bay Area which has led, and may continue to lead, to increased numbers of vehicle trips and total vehicle miles travelled in the area, which in turn serve to worsen regional air quality (see also the discussion below under the heading Cumulative Impacts). The CAP's TCMs are designed to reduce trips and vehicle miles traveled. The California Clean Air Act requires that "severe" areas achieve no net increase in trips by 1997.[26]

The CAP TCMs would act to further reduce emissions of both the "criteria" pollutants and air toxics such as benzene, and would, therefore, be expected to contribute to progressively cleaner air (i.e., less detrimental to health). However, specific exceptions related to this impact are worth noting. First, the CAP TCMs call for increased bus, ferry and train services. Increasing these services would involve air quality impacts, which could have corresponding public health impacts. For example, diesel exhaust, commonly associated with urban buses, is currently being evaluated for potential identification as a TAC (see Section 4.1, Air Quality). Increased bus service may, therefore, cause an increased health risk from exposure to diesel exhaust, particularly in areas where such emissions are concentrated, such as along bus routes or near transit stations.

Further, transportation services powered by electricity create demand from power generation facilities, which may create air quality (and potential public heath) impacts in the areas where the power is produced. It should be noted that power plant emissions can be controlled to very low levels when compared to vehicle emissions.[27]

Mitigation Measures

4.5-1 *None recommended or required.*

Impacts from Employer-Based Trip Reduction Measures

No adverse impacts are associated with this category of mobile source control measures.

Impacts from Mobility Improvements

No adverse impacts are associated with this category of mobile source control measures.

Impacts from Traffic Operation Management Control Measures

No adverse impacts are associated with this category of mobile source control measures.

Impacts from User Incentives

No adverse impacts are associated with this category of mobile source control measures.

Impacts from Indirect Source Review Measures

No adverse impacts are associated with this category of mobile source control measures.

Impacts from Implementation Support Measures

No adverse impacts are associated with this category of mobile source control measures.

Impacts Related to Motor Vehicle Control Measures

Impact

4.5-2 **Implementation of control measure H3 could involve the use of alternative fuels which may present potential health and safety hazards.**

Under this control measure, several options are viable for replacement of diesel and gasoline by alternative motor vehicle fuels or alternative technologies. Among alternative fuels, methanol, compressed natural gas and liquid petroleum gas are of interest. Electric vehicles are also in an advanced state of development. Of the listed options, conversion to methanol as an alternative fuel would have the greatest potential health and safety effects as described below.

Increased methanol usage may result in accidental methanol poisoning of owners or operators of methanol-fueled vehicles, automotive service personnel or others who may come into contact with the fuel. The primary routes of methanol exposure consist of ingestion and inhalation. Ingestion could occur during siphoning. Acute exposure to vapors could occur during refueling or being situated in a confined space such as a garage.

With current technology, methanol-fueled vehicles emit relatively large amounts of formaldehyde, a potential human carcinogen. In addition, methanol burns with an invisible flame, making methanol fires more dangerous and difficult to fight.

Mitigation Measures

4.5-2(a) *The potential air quality impacts from vehicular emissions of formaldehyde would be reduced by a requirement to have tailpipe catalytic controls installed on clean-fuel vehicles burning methanol. This impact would be significant and unavoidable.*

4.5-2(b) *Public and private entities involved in methanol transportation, distribution or other related activities, as well as agencies responsible for oversight of such activities, should jointly develop and implement measures to reduce the hazards associated with the use of methanol as an alternative fuel. Such measures should include, but not be limited to, using devices to prevent methanol vapors from escaping during transfer activities, posting hazard warning labels at methanol distribution areas, and disseminating methanol hazards information to concerned groups such as retailers and emergency response organizations.*

4.5-2(c) *Potential health and safety effects from other possible alternative fuels would be considered, and mitigation measures developed, prior to requiring the use of such fuels in vehicle fleets. Implementation of this mitigation measure would reduce the impact to a less than significant level.*

Impact

4.5-3 **If Contingency Measure H4 is implemented, then diesel exhaust emissions from urban buses would be reduced, thereby reducing an existing public health hazard. This would constitute a beneficial impact.**

For a discussion of diesel exhaust health effects, the reader is referred to the Setting sub-section above.

Mitigation Measures

4.5-3 *None recommended or required.*

Impact

4.5-4 **Implementation of control measure H3 and Contingency Measure H4 would increase electrical usage for vehicles and electricity distribution system development, which would increase human exposure to EMF. Based on**

currently available scientific information, this impact is considered less than significant.

In some localized instances, such as engines converted to electric motors, there may be some increased worker exposure to EMF. As previously noted, there are currently no standards for worker exposure to magnetic fields. Worker protection from electric fields is recommended at fields larger than 15 kV/m to prevent shock, spark discharges and other startle reactions.[28] Public exposure to field strengths of this magnitude would not be expected from the types of electrification strategies outlined in the CAP. Therefore, additional exposure to EMF would not constitute a significant health and safety impact.

Mitigation Measures

4.5-4 *None recommended or required.*

Impacts from Market-Based Transportation Measures

No adverse impacts are associated with this category of mobile source control measures.

Stationary Source Control Measures

Impacts from Surface Coating and Solvent Use Control Measures

Impact

4.5-5 **Implementation of control measures A1 through A13, A18 and A19 may reduce hazardous waste generation by reducing or replacing existing solvent uses in manufacturing and clean-up processes, thereby reducing a potential public health hazard. This constitutes a beneficial impact.**

Hazardous waste handling, transportation, storage and disposal is controlled by various federal, State and local agencies with responsibility for enforcing related laws and regulations. Due to the potential for oversight or upset conditions, however, a degree of public health hazard inevitably accompanies hazardous waste generation. Reducing hazardous waste generation is, therefore, assumed to be a beneficial public health and safety impact because of corresponding reductions in hazardous waste handling, storage, transportation and disposal.

Mitigation Measures

4.5-5 *None recommended or required.*

Impact

4.5-6 **Implementation of control measures A1, A2, A3, A5 through A13 and A18 may involve increased emissions of substances that may be toxic as a result of reformulations with non-precursor or "exempt" solvents. This would be a potentially significant impact.**

Workers or the public may be exposed to emissions of toxic "exempt" solvents, such as 1,1,1 trichloroethane. The U.S. Occupational Safety and Health Administration (OSHA) administers federal and State laws regarding worker exposure to hazardous substances and identifies the Permissible Exposure Limit (PEL) for many toxic compounds. In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) recommends TLVs as a time-weighted average concentration for many hazardous materials. The TLV is an average concentration for a normal 40-hour work week to which nearly all workers may be repeatedly exposed without adverse health impacts. TLVs are often used by OSHA in deriving PELs. It is the responsibility of OSHA to ensure that workplace health hazards are not significant. The public health is protected from health hazards posed by toxic substances in ambient air under the TAC identification and control procedures established in Assembly Bills 1807 (Tanner) and 2588 (Connelly/Stirling). The CARB and the BAAQMD are responsible for administering these processes.

Mitigation Measures

4.5-6 *See Mitigation Measure 4.1-21.*

Impact

4.5-7 **Implementation of control measures A9, A14, A15 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon. This would be a significant impact.**

These are several options for further reducing ROG emissions through the control measures cited above, including the use of abatement devices such as carbon adsorption or incinerators. This impact would result from the use of carbon adsorption, and the corresponding generation of

hazardous waste (spent carbon). Hazardous waste handling, storage, transportation and disposal can create worker or public health effects. However, it is the responsibility of various federal, State and local agencies with jurisdiction over hazardous waste to ensure that such activities are conducted in accordance with applicable laws and regulations. Assuming compliance with these laws and regulations, health effects from increased generation of solid and liquid hazardous waste associated with the CAP are expected to be less than significant.

Mitigation Measures

4.5-7 *Generators of solid and liquid hazardous waste would be obligated to follow federal, State and local laws and regulations for proper storage, handling and disposal of such wastes.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.5-8 **Implementation of control measures B1 through B6 would act to reduce emissions of benzene, an identified TAC, and would reduce public health risks associated with such emissions. Reducing benzene emissions constitutes a beneficial health impact.**

The exact health effects produced by a given reduction in atmospheric benzene emissions cannot be accurately quantified within the scope of this analysis. However, as stated earlier in this section, there is no threshold below which benzene exposure may be considered safe. CAP stationary source control measures should substantially reduce such emissions. For example, control measure B4 affects gasoline delivery vehicles. Benzene concentrations in tank headspace in these vehicles have been estimated at 2,900 ppm.[29]

Mitigation Measures

4.5-8 *None recommended or required.*

Impact

4.5-9 **Implementation of control measure B4 would reduce vapor leaks of flammable materials and reduce the fire hazard associated with such leaks. This constitutes a beneficial public safety impact.**

Mitigation Measures

4.5-9 *None recommended or required.*

Impact

4.5-10 **Implementation of control measures B1, B3, B5 and B6 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon.**

See discussion under Impact 4.5-7.

Mitigation Measures

4.5-10 *See Mitigation Measure 4.5-7.*

Impacts from Refinery and Chemical Processes Control Measures

Impact

4.5-11 **Implementation of control measures C1, C2, C3, C4, C5 and C6 would act to reduce emissions of benzene, an identified TAC, and would reduce public health risks associated with such emissions. Reducing benzene emissions constitutes a beneficial health impact.**

See discussion under Impact 4.5-8

Mitigation Measures

4.5-11 *None recommended or required.*

Impact

4.5-12 **Implementation of control measures C1, C2 and C3 would reduce vapor leaks of flammable materials and reduce the fire hazard associated with such leaks. This constitutes a beneficial public safety impact.**

Mitigation Measures

4.5-12 *None recommended or required.*

Impact

4.5-13 **Implementation of control measure C4 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon.**

See discussion under Impact 4.5-7.

Mitigation Measures

4.5-13 *See Impact 4.5-7.*

Impacts from Combustion of Fuels (NO_x Sources) Control Measures

Impact

4.5-14 **Implementation of control measures D1, D2, D3 and D4 could involve the use of ammonia and catalyst materials, and could create potential health impacts from increased ammonia production, transport, storage, and use. Spent catalyst materials would also contribute to an increase in hazardous waste for disposal.**

Ammonia is a toxic compound and its production, transport, storage and use can be hazardous. Worker or public health could be affected in the event of an accidental release. Handling and transport of ammonia could possibly result in health impacts. Various federal, State and local agencies (e.g., EPA, Department of Transportation, OSHA, etc.) with jurisdiction over hazardous materials and waste are responsible for ensuring that hazardous materials and waste handling activities are conducted in accordance with applicable laws and regulations. Assuming compliance with these laws and regulations, health effects from increased ammonia use and ammonia waste disposal associated with the CAP are expected to be less than significant.

Mitigation Measures

4.5-14(a) *The BAAQMD would consider alternatives to methods which use ammonia as a reducing agent when promulgating requirements for NO_x emission reduction technologies. Potential health and safety effects of substitute reducing agents or control methods will be used as a criterion for evaluating alternative technologies.*

4.5-14(b) *The BAAQMD would consider the design of ammonia storage and handling equipment during the permit review process for individual facilities.*

Impacts from Other Industries/Commercial Processes Control Measures

Impact

4.5-15 **Implementation of control measures E1 and E3 may involve increased generation of solid and liquid hazardous waste from spent or regenerated activated carbon.**

See discussion under 4.5-7.

Mitigation Measures

4.5-15 *See Mitigation Measure 4.5-7.*

Impacts from Other Stationary Source Control Measures

Impact

4.5-16 **Implementation of control measure F4 would act to reduce emissions of benzene, an identified TAC, and would reduce public health risks associated with such emissions. Reducing benzene emissions constitutes a beneficial health impact.**

See discussion under Impact 4.5-8

Mitigation Measures

4.5-16 *None recommended or required.*

Impacts from Intermittent Control Measures

No adverse impacts are associated with this category of stationary source control measures.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Regional and Local Impacts and Mitigation Measures

Although implementation of the CAP could result in some adverse health effects, a net beneficial health effect is expected from reducing criteria pollutants and TACs in the ambient air. Health impacts could occur from fuel and solvent reformulations or substitutions, increased use of ammonia or other reducing agents, increased hazardous waste generation from abatement devices (e.g., spent activated carbon), increased diesel exhaust emissions, and additional electromagnetic field exposure. However, after mitigation, such impacts are expected to be less than significant. Implementation of the CAP is not expected to contribute to cumulative adverse health effects.

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1. Bay Area Air Quality Management District (BAAQMD), Air Quality Handbook, 1989-1990, p. 17.

2. As cited in BAAQMD's Air Quality Handbook.

3. BAAQMD, Air Quality and Urban Development, Guidelines for Assessing Impacts of Projects and Plans, November 1985, p. IV-1.

4. BAAQMD, 1989-1990, op. cit.

5. Assembly Bill No. 2595, Sher., Section 1.(b)(1).

6. BAAQMD, November 1986, op. cit., p. IV-4.

7. Mary O. Amdur, "Air Pollutants," in Casarett and Doull's Toxicology, The Basic Science of Poisons, Third Edition, 1986, p. 819.

8. Ibid., p. 817.

9. Ibid., p. 813.

10. BAAQMD, 1989-1990, op. cit., p. 18.

11. Penny M. Carey, EPA, Air Toxics Emissions from Motor Vehicles, September, 1987, p. vii.

12. California Health and Safety Code, Division 26, Section 39655.

13. California Air Resources Board, "Air Toxics Update #2," April 1986.

14. Richard G. Cudding, William C. Griffith and Roger O. McClellan, "Health risks from light-duty diesel vehicles," *Environmental Science and Technology*, Vol. 18, No. 1, 1984.

15. Ibid.

16. This standard uses the unit of measurement grams per brake horsepower-hour as opposed to previous standards which used grams per mile traveled.

17. Gary M. Williams and John H. Weisburger, "Chemical Carcinogens," in Casarett and Doull's Toxicology, The Basic Science of Poisons, Third Edition, 1986, p. 122.

18. Daniel B. Menzel and Mary O. Amdur, "Toxic Responses of the Respiratory System," in Casarett and Doull's Toxicology, The Basic Science of Poisons, Third Edition, 1986, p. 350.

19. Penny M. Carey, op. cit., p. xvi.

20. Ibid.

21. Ibid., p. xviii.

22. South Coast Air Quality Management District (SCAQMD) and Southern California Association of Governments (SCAG), Draft Environmental Impact Report for 1991 Air Quality Management Plan, March, 1991, p. 4.17-7.

23. California Department of Health Services, Electric and Magnetic Fields: Measurements and Possible Effects on Human Health from Appliances, Power Lines, and Other Common Sources, 1990.

24. Office of Planning and Research, CEQA: California Environmental Quality Act, Statutes and Guidelines 1986, June 1986, Appendix G.

25. An attempt to quantify adverse health effects resulting from existing or past air quality conditions would be highly speculative and is considered unnecessary for the purposes of this discussion, since the net effect of the TCMs would be to improve such conditions.

26. California Clean Act, Section 40920(a)(2).

27. BAAQMD, 1991 Clean Air Plan, Candidate Control Measure Descriptions, Draft of March 18, 1991, p. 183.

28. SCAQMD and SCAG, op. cit., p. 4.17-6.

29. BAAQMD, March 18, 1991, op. cit.

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4.6 PUBLIC SERVICES AND UTILITIES

This section discusses potential public service and utilities impacts that could result from implementation of the proposed Clean Air Plan. The analysis includes identification, description and evaluation of the existing Bay Area public services and utilities infrastructure and projected requirements as a result of the proposed control measures.

SETTING

Infrastructure

Infrastructure is comprised of all public services and utilities and is defined as schools, water and gas transmission lines, electricity, police and fire stations, sewerage treatment facilities and piping, and solid waste disposal. There are many serious infrastructure problems facing the Bay Area today. According to a survey of Bay Area Planning Departments, problems of water supply, sewage processing and outflow capacity, schools, and solid waste are at or approaching the critical stage in most cities and counties.[1]

Growth in the Bay Area through the year 2000 will require additions to the infrastructure. It is assumed that the necessary infrastructure improvements will be added where needed. Because local governments rarely have sufficient funds required for infrastructure needs, developers, new home buyers, and local tax payers/ratepayers will likely be held responsible for the necessary costs associated with the improved infrastructure. If the infrastructure improvements are not made in a timely manner, measures may be implemented to reduce population and job growth potential to avoid environmental and congestion costs.[2]

Public Services

Public services are specified as police and fire departments, schools, and city, county, or community government organizations, including planning and public works departments. All public drainage facilities are under the jurisdiction of the local government (typically the public works department) with the exception of facilities that are part of a flood control district.

Police and fire departments are staffed and equipped based on local ratios of officers to people or standards of emergency response time. These ratios or standards are often described in city or county general plans. Examples of standards or ratios include:

- o A maximum running time of three minutes and/or 1.5 miles from the first-due station, and a minimum of three fire fighters shall be maintained in all central business district (CBD), urban, and suburban areas. Fire departments are often the "first responder" in case of fire, explosion, accident and other catastrophic events involving hazardous substances.
- o A total response time of five minutes shall be maintained in CBD, urban, and suburban areas.
- o A police protection services standard of 1.5 patrol officers per 1,000 residents within jurisdiction.
- o A maximum response time goal for "priority 1" or "priority 2" calls of five minutes for 90 percent of all emergency response in CBD, urban and suburban areas, shall be established.

Needed upgrades to facilities and equipment are identified as part of environmental review and area planning activities.

Local schools, parklands, and other public service needs are usually assessed in the environmental review process for individual projects in order to monitor the ability to serve development.

Utilities

Public utilities include water and natural gas transmission lines, electricity, sewerage, and solid waste facilities. As mentioned above, water supply and sewerage treatment and outflow capacity are reaching the critical stages in many Bay Area counties. Water services in the Bay Area are provided by municipalities or special service districts. Sewerage treatment is provided throughout the Bay Area by sanitary districts and wastewater management agencies. Increased demand for both wastewater treatment capacity and water supply are accommodated by existing regional policies which have been subjected to extensive environmental analysis pursuant to CEQA. Pacific Gas and Electric Company supplies all natural gas and electricity to the Bay Area. (Please refer to Section 4.7, Energy, for discussion of capacity and supply of natural gas and electricity.)

Private scavenger companies consolidate municipal garbage throughout the Bay Area for disposal in landfills. In 1989, Assembly Bill 939 was enacted and requires all cities and counties in

California to prepare an Integrated Solid Waste Management Plan (ISWMP) in an effort to divert solid waste currently designated for landfills by 25 percent in 1995 and by 50 percent in 2000. The ISWMPs will contain three major elements: Source Reduction and Recycling (including a waste characterization study), Siting Program for Landfills, and Household Hazardous Waste Program. The plans are being prepared currently and are scheduled for completion by the mid-1990s.

Hazardous Waste Management Plans (HWMPs) have been developed by local jurisdictions in response to growing concern for the need to plan for the effective management of hazardous waste. Policies and programs implemented as part of HWMPs will promote waste reduction, ensure that state-of-the-art technology is being used, reduce unsafe and illegal hazardous waste management practices, and improve water quality.

IMPACTS AND MITIGATION MEASURES

Basis For Impacts

The BAAQMD expects to delegate implementation of some of the transportation control measures to local governments, provided local programs meet delegation criteria. Additional resources may be required of local governments in order to implement and enforce these measures. The CAP would likely result in increased demand for public services including county health agencies, local police and fire departments (to handle accidents), schools, and libraries and parks (from infill development). New transportation facilities or redirected urban development could require modifications to stormwater drainage facilities.

The CAP would likely result in increased utility demand for hazardous waste-related services, solid waste disposal, water treatment, and water demand related to stationary source control technologies (e.g., scrubbers, incinerators). Many facilities would be required to meet stationary source control measures through changes in operating procedures (i.e., alternative devices or changes in emission control equipment) that generate hazardous waste and would impact the local utilities indirectly. Control measures that increase consumption of energy or water could possibly necessitate alteration to the respective utilities. It is unlikely that any municipal utilities, water treatment facilities or waste disposal operations would be impacted directly by any of the CAP control measures.

Standards of Significance

For the purposes of this project, a mobile or stationary source control measure would be considered to have a significant impact on public services if it would require new or altered government services in any of the following areas: fire protection, police protection, schools, parks and recreational facilities, maintenance of public facilities, or other governmental services. A control measure would have a significant impact on utilities if it would result in the need for new systems or substantial alterations to water, wastewater or solid waste facilities. Review of regional and State transportation, air quality, and water quality plans and regulations are considered in the infrastructure constraint evaluation.

For this project, the significance of public service impacts is evaluated based on the following:

Police:	Does the CAP require additional staff and equipment to maintain acceptable service ratios as described in local general plan?
Fire:	Does the CAP require additional staff and equipment to maintain an acceptable level of service (response time, equipment)?
Schools:	Does the CAP require expansion or realignment of school systems?
Parks and Recreational Facilities:	Does the CAP require additional parkland to remain in conformance with locally acceptable or adopted park standards?

Public service impacts may also include increased demand on local city or county agencies. Base conditions of public services in the Bay Area are established in local general plans, including staff and equipment, in addition to identification of local service standards or ratios. The CAP-related service requirements are projected and are compared to the existing conditions to assess impacts.

For this project, the significance of utility impacts are evaluated based on whether or not the CAP control measures would result in a substantial increase in the consumption of potable water or a substantial increase in demand for water supply treatment or distribution facilities, wastewater treatment and collection capacity, stormwater drainage systems, or landfill capacity. Utility impacts may also include an increased demand for hazardous waste-related services and wastewater treatment. The project's utility requirements are projected and qualitatively compared to the existing Bay Area infrastructure utility capacities.

Mobile Source Control Measures

Overview

Most public services and utilities impacts from implementation of the mobile source control measures would be to regional and local governments. The staffing needs of the BAAQMD would certainly be affected by implementation of CAP control measures. In situations in which local governments have primary authority for implementation or in which the BAAQMD delegated such authority, local government staffing needs would be affected. The BAAQMD would also be affected as it would implement and monitor the mitigation measures described in this EIR.

Impacts from Employer-Based Trip Reduction Measures

Impact

4.6-1 **Implementation of TCM 1 would require implementation through public agencies. If local city or county governments were unable to handle the additional demand, this would be a significant public services impact.**

TCM 1 would expand employer assistance programs and information sources through RIDES and CMP agencies. This TCM would result in additional demand for public service personnel in cities and counties.

Mitigation Measure

4.6-1 *This impact would be reduced to a level of insignificance by hiring more employees as resource needs arise. Local governments could charge fees for employer assistance programs to fund these new positions.*

Impact

4.6-2 **Implementation of TCM 2 could involve delegation of implementation to cities and counties. If local city or county governments were unable to handle the additional demand, this would be a significant public services impact.**

TCM 2 would establish programs and ordinances that, if delegated by the BAAQMD, would be implemented by local governments. Delegation criteria will likely include: an air quality element in the local general plan, a local program as strict or stricter than that of the BAAQMD, and adequate funding for implementation and monitoring. This TCM would result in additional demand for public service personnel in cities and counties receiving delegation authority.

Mitigation Measure

4.6-2(a) *This impact would be reduced to a level of insignificance by hiring more employees as resource needs arise. Local governments could charge permit fees to fund these new positions. The BAAQMD would likely charge permit fees to cover its costs.*

4.6-2(b) *The BAAQMD is seeking funds (AB 434 Increase in Vehicle Registration Fees) for local governments, which are delegated trip reduction rule authority.*

Impact

4.6-3 **Implementation of TCM 1 and TCM 2 would reduce commuter vehicle trips. This would be a beneficial effect on public services.**

Many of the mobile source control measures would reduce total vehicle trips in the Bay Area and encourage use of alternative modes of transit. The reduction in vehicle trips would result in a decrease in automobile-related accidents and a decrease in police/sheriff and fire services needed to respond to these accidents. While operation of each related control measure would not necessarily result in a substantial effect on public services in each region, implementation of all the CAP mobile source control measures may have a substantial beneficial effect on the demand for public services in the Bay Area.

Mitigation Measure

4.6-3 *None recommended or required*

Impacts from Mobility Improvements

Impact

4.6-4 **Implementation of TCMs 3, 4, 5, 7, 8, and 9 would result in construction and/or improvement of transit, HOV, and bicycle facilities. If storm sewer capacities were exceeded due to redirected drainage patterns, this would be a significant public services impact.**

While construction of new transit lines, HOV facilities, and bicycle routes generally would occur in highly urbanized areas, the potential exists for areas to experience altered drainage patterns, including increased impervious surface areas and increased surface runoff. The altered drainage

patterns could combine to exceed current drainage capacities, causing flood hazards. Changes in stormwater capacity requirements may cause significant public service impacts, especially to public works departments, in regions of the Bay Area that are currently rated as critical or severe regarding stormwater capacity. While implementation of each individual control measure may not necessarily result in a substantial increase in stormwater capacity demand, the effects of all mobile source control measures associated with the CAP may result in a significant impact to entire city and/or county storm sewer systems.

TCM 6, "Improve Intercity Rail Service," TCM 10, "Youth Transportation," and TCM 11, "Freeway Traffic Operations," would increase service and mobility but do not involve construction of transit lines or improvements. Implementation of these measures would not adversely affect public services and utilities.

<u>Mitigation Measure</u>

Implementation of the following mitigation measures would reduce this impact to a level of insignificance.

4.6-4(a) *During CEQA review of specific mobility improvements, construction plans would be reviewed to minimize drainage system demand and flood hazards. Review of construction plans would be the responsibility of the permitting agency, e.g., local government, transit operators, Caltrans, and perhaps MTC. MTC reviews only new transit facilities, but not modified transit facilities.*

4.6-4(b) *For projects where flood hazards are inevitable, flood control measures and drainage systems would be designed or expanded to accommodate new drainage requirements. Special attention would be paid to the scope of all CAP-related measures to be implemented within a drainage area.*

<u>Impact</u>

4.6-5 **Implementation of TCM 10 would require coordination between school districts, transit operators and MTC to implement the Youth Transportation control measure. This would be a potentially significant impact.**

While schools are not a critical infrastructure problem in all parts of the Bay Area, some localities may need additional resources to implement this program. Cities and counties may also require additional staffing to meet the requirements of the program.

Mitigation Measure

4.6-5 *This impact would be mitigated to a level of insignificance if additional personnel were hired to meet specific resource needs.*

Impacts from Traffic Operation Management Control Measures

Impact

4.6-6 **Implementation of TCM 12 would require coordination between neighboring jurisdictions on signal timing and other strategies. This would be a less than significant impact.**

Congestion Management Plans would include arterial traffic management strategies as a key requirement in the Travel Demand Management elements of general plans. Local planners are currently responsible for preparing the plans, and TCM 12 would only involve the coordination of new plans with local jurisdictions. This would be a less than significant impact.

Mitigation Measure

4.6-6 *None recommended or required.*

Impacts from User Incentives

Impact

4.6-7 **Each of the User Incentive Control Measures (TCMs 13, 14, and 15) would reduce vehicle trips. This would be a beneficial public services effect.**

See discussion under Impact 4.6-3.

Mitigation Measure

4.6-7 *None recommended or required.*

Impacts from Indirect Source Review Measure

Impact

4.6-8 **Implementation of TCM 16 could involve delegation of the indirect source control regulation to cities and counties. If local governments were not equipped to handle the additional demand, this would be a significant public services impact.**

Under TCM 16 the BAAQMD could delegate the implementation of the indirect source control regulation to cities and counties. At this time, the BAAQMD is still developing criteria for delegation of these responsibilities. Conditions for approval of delegation could include: 1) adoption of air quality elements in local general plans, 2) local requirements meet or exceed the BAAQMD's requirements, and 3) that adequate funding for implementation and monitoring exist. Where delegated to local governments, this program may be implemented by adding requirements within existing local building and/or use permit systems. Since the delegation criteria have not been developed, and since certain cities may implement their own programs, the extent of the impact on local cities and counties is not measurable at this time. It is clear that this TCM would result in additional city and county review and additional demands on public service resources in the Bay Area.

Mitigation Measure

4.6-8(a) *This impact would be reduced to a level of insignificance by hiring more employees as resource needs arise. Local governments could charge permit fees to fund these new positions.*

4.6-8(b) *The BAAQMD is seeking a source of funds (AB 434 – Increase in Vehicle Registration Fees) for local governments which are delegated indirect source review authority.*

Impacts from Implementation Support Measures

Impact

4.6-9 **Implementation of TCM 18 and 19 would require cities and counties to prepare plans to meet the control measure requirements. If local governments were not equipped to handle the additional demand, this would be a significant public services impact.**

TCM 18 would encourage local governments to prepare site specific plans in cooperation with the transit operators for higher densities near transit stations. Under TCM 19, the Air District would work with local cities and counties to prepare Air Quality Elements.

Mitigation Measure

4.6-9(a) *This impact would be reduced to a level of insignificance by hiring more employees as resource needs arise.*

4.6-9(b) *The BAAQMD is seeking a source of funds (AB 434 – Increase in Vehicle Registration Fees) for local governments to develop, adopt or revise an air quality element.*

Impact

4.6-10 **Implementation of TCM 18 would result in construction of high-density housing near transit stations. If storm sewer capacities were exceeded due to redirected drainage patterns, this would be a significant public services impact.**

See discussion under Impact 4.6-4.

Mitigation Measure

4.6-10 *See Mitigation Measure 4.6-4. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.6-11 **Implementation of TCM 18 would create increased demand on local services and utilities for high-density residential housing or commercial development. If the infrastructure was not equipped handle the increased demand, this would be a significant public services and utilities impact.**

Infill development would create increased demand on services such as schools, libraries and parklands and may cause conflicts with local general plan standards and/or ratios. Similarly, local utilities such as water, solid waste, and sewerage would experience increased demand. While TCM 18 would increase demand on local utilities, the demand would be less than that of alternate types of development, e.g., low-density, single-family residential. Public utility capacities should already

be expanded to meet growth projections for local cities and counties. However, these services have been identified as problems in regions of the Bay Area and significant impacts may occur.

Mitigation Measure

Implementation of the following control measures would reduce this impact to a level of insignificance.

4.6-11(a) *This impact would be reduced to a level of insignificance through local government verification of appropriate utility capacities prior to approval of development and provision of on- and off-site utility system improvements to meet requirements, if necessary.*

4.6-11(b) *Water and solid waste conservation techniques should be required by local permitting agencies to reduce project service demand.*

Impact

4.6-12 **Implementation of TCM 18 would lower per capita consumption rates of municipal and domestic water supply due to increased development densities. This would be a beneficial public utilities effect.**

For example, increased density would result in smaller water demand, since the amount of landscaping per person would decrease.

Mitigation Measure

4.6-12 *None recommended or required.*

Impact

4.6.13 **Implementation of TCMs 17, 18, 19, and 20 would encourage modes of transportation that are alternative to the automobile. These measures would have a beneficial public services effect.**

See discussion under Impact 4.6-3.

Mitigation Measure

4.6-13 *None recommended or required.*

Impacts Related to Ozone Excess "No Drive Days"

Impact

4.6-14 **Implementation of G3 and Contingency Measure G4 would encourage modes of transportation that are alternatives to the automobile and thus could result in reduced demand for police and fire services to respond to accidents. These measures would have a beneficial public services effect.**

See discussion under Impact 4.6-3.

Mitigation Measure

4.6-14 *None recommended or required.*

Impacts Related to Motor Vehicle Control Measures

Impact

4.6-15 **Implementation of H3 would require certain fleet operators to purchase and operate cleaner vehicles. This would be a significant public services and utilities impact.**

For public services and utilities, acquisition of cleaner vehicles would require a substantial commitment of money.

Mitigation Measure

4.6-15 *This impact could be reduced by garnering more resources to pay for equipment and personnel.*

Since it is unclear how this measure would be paid for, this is a significant unavoidable impact.

Impact

4.6-16 **Implementation of H3 could increase the use of methanol-fueled vehicles. This would be a significant public services impact.**

H3 would require certain fleet operators to purchase and operate either alternate-fueled vehicles or low-emitting gasoline-powered vehicles. Methanol is one of several alternate fuels that could be used in response to this requirement. Methanol burns with an invisible flame, making methanol

flames more dangerous and difficult to fight. Additional emergency response workers and planning would be required to accommodate increased methanol use.

Mitigation Measures

4.6-16 *This impact could be reduced to a level of insignificance through hiring of additional emergency response personnel and preparation of methanol-specific emergency response plans for areas known to have methanol-fueled vehicles fleets and routes. Emergency response plans would be developed to include health and safety requirements for emergency response workers, fleet vehicle descriptions, and route maps.*

Impacts from Market-Based Transportation Control Measures

Impact

4.6-17 **Implementation of market-based control measures would reduce vehicle trips in the Bay Area. This would be a beneficial public services effect.**

See discussion under Impact 4.6-3.

Mitigation Measure

4.6-17 *None recommended or required.*

Stationary Source Control Measures

Impacts from Surface Coatings and Solvent Use Control Measures

Impact

4.6-18 **Implementation of control measures A9, A11, A14, and A16, would encourage facilities to use pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous-waste related demands, this would be a significant public services and utilities impact.**

The additional pollution control devices would include incinerators and/or carbon adsorption units. The hazardous wastes generated would be spent activated carbon. Abatement devices that produce hazardous wastes would increase the demand for operations that transport, treat, and dispose of

hazardous waste. Additional handling and transportation of hazardous waste would result in an increased number of accidental spills and releases and an increased demand for emergency response workers. Increased staffing at local regulatory agencies may be required to permit and enforce additional abatement devices. Hazardous waste disposal in landfills is subject to federal land disposal restrictions. Additional wastewater would be produced as generators try to meet the stringent pretreatment requirements for the additional waste. Local wastewater treatment and water supply facilities would be affected as they attempt to maintain discharge standards and water quality. While implementation of each control measure may not create a significant impact, implementation of all stationary control measures that generate hazardous waste may lead to a significant public services and utilities impact.

Mitigation Measure

Implementation of the following mitigation measures would reduce this impact to a less than significant level.

4.6-18(a) *Control device residues, e.g., spent activated carbon, would be regenerated or recycled, whenever possible, to reduce quantities of hazardous waste generated.*

4.6-18(b) *Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations.*

4.6-18(c) *The BAAQMD would encourage local cities and counties to consider additional requirements for emergency response workers and enforcement officers when assessing staffing and equipment requirements.*

4.6-18(d) *EPA regulations for industrial stormwater and wastewater discharges will decrease the impact of increased hazardous waste generation. Local wastewater treatment and water supply utilities would modify operations to accommodate increased contaminants in surface water, groundwater, and wastewater.*

Impact

4.6-19 **Implementation of A9, A11, A14, and A16 would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.**

Water supply is at a critical stage throughout the Bay Area due to drought conditions. Any increase in industrial water consumption would be a significant impact. This impact would be a significant unavoidable impact.

Mitigation Measure

4.6-19 *None available.*

Impact

4.6-20 **Implementation of A3, A5, A17, A18, and A19 may result in a decrease in hazardous waste produced at the respective facilities. This would be a beneficial public services effect.**

Mitigation Measure

4.6-20 *None recommended or required.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.6-21 **Implementation of B1, B2, and B6, may result in pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous waste-related demands, this would be a significant public services and utilities impact.**

See discussion under Impact 4.6-19.

Mitigation Measure

4.6-21 *See Mitigation Measure 4.6-18. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.6-22 **Implementation of B1, B2, and B6 would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.**

Water supply is at a critical stage throughout the Bay Area due to drought conditions. Any increase in industrial water consumption would be a significant impact. This impact would be a significant unavoidable impact.

Mitigation Measure

4.6-22 *None available.*

Impact

4.6-23 **Implementation of B4 would result in a fire safety advantage and thus reduced demand for fire services due to reduced vapor leaks both while in transit and upon arrival at the gasoline dispensing facility. This would be a beneficial public services effect.**

Mitigation Measure

4.6-23 *None recommended or required.*

Impacts from Refinery and Chemical Processes Control Measures

Impact

4.6-24 **Implementation of C1, C4, and C7 may result in use of pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous waste-related demands, this would be a significant public services and utilities impact.**

See discussion under Impact 4.6-19.

Mitigation Measure

4.6-24 *See Mitigation Measure 4.6-18. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.6-25 **Implementation of C1, C4, and C7 would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.**

Water supply is at a critical stage throughout the Bay Area due to drought conditions. Any increase in industrial water consumption would be a significant impact. This impact would be a significant unavoidable impact.

Mitigation Measure

4.6-25 *None available.*

Impact

4.6-26 **Implementation of C2 and C3 would reduce fugitive emissions and help to lower the risk of fires. This would be a beneficial public services effect due to decreased fire service demand.**

Mitigation Measure

4.6-26 *None recommended or required.*

Impacts from Combustion of Fuels (NO_x) Control Measures

Impact

4.6-27 **Implementation of measures D1 through D5 would cause many industries to utilize ammonia injection (noncatalytic) and selective catalytic reduction (SCR) control technologies which use and generate hazardous substances. If the local infrastructure was unable to handle the additional hazardous substance-related demands, this would be a significant public services and utilities impact.**

The ammonia injection (noncatalytic) and SCR processes would utilize hazardous materials (e.g., ammonia). Both processes would generate hazardous waste (spent catalyst) and wastewater. There would be an increase in production, transport, use, storage, and disposal of ammonia, and an increase in transport and disposal of spent catalyst. Additional handling and transportation of

hazardous substances could result in an increased number of accidental releases or spills and an increased demand for emergency response workers. Increased staffing at local regulatory agencies may be required to permit and enforce additional abatement devices. Hazardous waste disposal in landfills is subject to federal land disposal restrictions and treatment may produce wastewater. Additional wastewater would be produced from removal of ammonium salt deposits downstream of the unit reactor. Local wastewater treatment and water supply facilities would be affected as they attempt to maintain water quality and discharge standards. While the implementation of each control measure may not create a significant impact, implementation of all control measures requiring ammonia injection and SCR processes may cause a significant public services and utilities impact.

Mitigation Measure

Implementation of the following mitigation measures would reduce this impact to a level of insignificance:

4.6-27(a) *Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations.*

4.6-27(b) *The BAAQMD would encourage local cities and counties to consider additional requirements for emergency response and health department workers when assessing staffing and equipment requirements.*

4.6-27(c) *Ammonia injection and SCR control device residues would be regenerated or recycled, whenever possible, to reduce quantities of hazardous materials and waste.*

4.6-27(d) *EPA regulations for industrial stormwater and wastewater discharges would decrease the impact of increased hazardous materials and waste. Local water treatment and supply utilities would modify operations to accommodate increased contaminants in surface water, groundwater, and wastewater.*

Impact

4.6-28 **Implementation of D2 may increase methanol-fueling for small turbines, or those not equipped with SCR. This would be significant public services impact.**

Methanol burns with an invisible flame, making methanol flames more dangerous and difficult to fight. An increase in emergency response workers and coordination would be required.

Mitigation Measures

4.6-28 *This impact could be reduced to a level of insignificance through hiring of additional emergency response personnel and preparation of methanol-specific emergency response plans for facilities known to use methanol fueling techniques. Emergency response plans would be developed to include health and safety requirements for emergency response workers and facility descriptions.*

Impacts from Other Industrial/Commercial Process Control Measures

Impact

4.6-29 **Implementation of E1 and E3 may require add-on pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous waste-related demand, this would be a significant public services and utilities impact.**

See discussion under Impact 4.6-19.

Mitigation Measure

4.6-29 *See Mitigation Measure 4.6-18. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impacts

4.6-30 **Implementation of E1 and E3 would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.**

Water supply is at a critical stage throughout the Bay Area due to drought conditions. Any increase in industrial water consumption would be a significant impact. This impact would be a significant unavoidable impact.

Mitigation Measure

4.6-30 *None available.*

Impacts

4.6-31 **Implementation of E3 would result in increase use of self-cleaning control systems, which should reduce fire hazards caused by grease build-up in the exhaust systems. This would be a beneficial public services impact due to decrease fire service demand.**

Mitigation Measures

4.6-31 *None recommended or required.*

Impacts From Other Stationary Sources Control Measures

Impact

4.6-32 **F1, Contingency Measure F2, and F4 encourage the use of pollution control devices that generate hazardous waste. If the local infrastructure was unable to handle the additional hazardous waste-related demands, this would be a significant impact.**

See discussion under Impact 4.6-18.

Mitigation Measure

4.6-32 *See Mitigation Measure 4.6-18. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.6-33 **Implementation of F1, Contingency Measure F2, and F4 would encourage facilities to use pollution control devices that consume water. This would be a significant utilities impact.**

Water supply is at a critical stage throughout the Bay Area due to drought conditions. Any increase in industrial water consumption would be a significant impact. This impact would be a significant unavoidable impact.

Mitigation Measure

4.6-33 *None available.*

Impacts From Intermittent Control Measures

Impact

4.6-34 **Implementation of G1 would result in temporary, decreased use of devices that can cause fires, spills, and accidents. This would be a beneficial public services effect.**

Mitigation Measure

4.6-34 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

Several of the impacts identified above for the mobile source control measures would also be cumulative impacts. As mentioned earlier, there are several serious infrastructure problems facing the Bay Area today. As growth continues and more measures were adopted and implemented throughout the Bay Area, more cumulative impacts would occur. The delegation of some TCMs to local governments would increase demand for resources, staffing, and enforcement and create cumulative impacts. There would also be cumulative impacts on county health agencies; local police and fire departments (to handle accidents); and school, libraries, parks and local utilities (from infill development). New transportation facilities or redirected urban development could require modifications to stormwater drainage facilities and would also create cumulative significant public service and utilities impacts. The cumulative impacts of the mobile source control measures would exacerbate the existing infrastructure problems which are expected to get even worse in the near future.

The same mitigation measures proposed above would be used in relation to these impacts.

Stationary Source Control Measures

Several of the impacts identified for the stationary source control measures also would be cumulative impacts. As mentioned earlier, there are several serious infrastructure problems facing the Bay Area today. As growth continues and more measures were adopted and implemented throughout the Bay Area, more cumulative impacts would occur. The CAP would likely result in increased demand for hazardous waste-related services, such as emergency response, solid waste disposal, water treatment, and water demand related to stationary source control technologies (e.g., SCR) and would create cumulative impacts on these utilities. Many facilities would be required to meet stationary source control measures through changes in operating procedures (i.e., alternative devices or changes in emission control equipment) that generate hazardous waste and would impact the local utilities indirectly and would have a cumulative effect. Control measures that increase consumption of energy or water could cause cumulative impacts and necessitate alteration to the respective utilities. The cumulative impacts of the stationary source control measures would exacerbate the existing infrastructure problems which are expected to get even worse in the near future.

The same mitigation measures proposed above would be used in relation to these impacts.

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1. Raymond J. Brady, ABAG, Community Infrastructure Problems: Third In a Series of Surveys of Nay Area Planning Departments, June 1990.

2. Association of Bay Area Governments, Projections 90, December, 1989.

4.7 ENERGY

This section discusses the energy implications of the proposed Clean Air Plan. The analysis includes identification, description and evaluation of the use of nonrenewable energy sources and a determination of whether the proposed plan would substantially increase the use of nonrenewable energy or use it in a wasteful manner.

SETTING

Regulatory Framework

Both the federal government and the State recognize the importance of energy conservation and have addressed the issue through legislation. The most encompassing energy legislation in the State is the Warren-Alquist Act. The Warren-Alquist Act, in effect since January 7, 1975, established the California Energy Resources Conservation and Development Commission (CEC) and gave it certain powers to certify power plants, conduct research and development of alternative energy sources, develop energy conservation measures, and, in general, consolidate various State functions related to energy resources. The Act goes on to state the following:

> "The present rapid rate of growth in demand for electric energy is in part due to wasteful, uneconomic, inefficient, and unnecessary uses of power and a continuation of this trend will result in serious depletion or irreversible commitment of energy, land and water resources, and potential threats to the State's environmental quality. It is further the policy of the State and the intent of the California Legislature to employ a range of measures to reduce wasteful, uneconomical, and unnecessary uses of energy, thereby reducing the rate of growth of energy consumption, prudently conserve energy resources, and assure statewide environmental, public safety, and land use goals."

A second major piece of legislation addressing energy conservation was adopted as an amendment (Sec. 21100c) to the California Environmental Quality Act (CEQA). This amendment directs all State Agencies, Boards, and Commissions to evaluate in Environmental Impact Reports (EIRs) mitigation measures "to reduce wasteful, inefficient, and unnecessary consumption of energy."

In California, all cities and counties are required to have an energy analysis in the housing element of their General Plans. This, in combination with Title 24, Part 2, Chapter 2-53, of the California Code of Regulations, determines residential energy consumption planning and patterns.

Description of Energy and Conventional Sources

Energy is the capacity for doing work. There are several forms of energy, and one form may be changed to another, such as burning coal to produce steam to drive a turbine which produces electricity. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat. Energy is measured in terms of the work it is capable of doing. Electric energy is usually measured in kilowatt-hours (kWh); natural gas in British Thermal Units (Btu), the quantity of heat necessary to raise the temperature of one pound of water one degree Fahrenheit. A kilowatt is a measure of power, or heat flow rate, and one kilowatt-hour equals 3,413 Btu.

Virtually every California community is dependent on three major types of energy: petroleum fuels, natural gas and electricity. Of these three, oil and gas are considered "primary" sources of energy. The production of electricity requires the consumption of primary energy sources; other energy resources used to generate electricity are nuclear, solar, wind, and hydro sources.

Petroleum Fuels

Petroleum fuels consist primarily of gasoline and diesel fuel for vehicles, fuel oils for industry and electrical power generation, and a variety of other liquid fuels, such as kerosene for jet fuel. Petroleum fuel is measured in gallons and contains approximately 125,000 Btu/gallon for gasoline and 138,700 Btu/gallon for diesel.[1]

Natural Gas

Natural gas is usually produced in conjunction with oil production. The origin of supplies, delivery systems, and processing requirements, however, are very different from California oil supplies. Natural gas is measured in cubic feet and contains approximately 1,050 Btu/cubic foot (140 Btu/gallon). One therm of natural gas equals 100,000 Btu.

Electricity

In contrast to oil and gas, most electricity is produced by "consuming" other resources. After these primary energy sources are converted to electricity, the electricity is transmitted instantaneously through a vast network of transmission and distribution lines. Of the amount of energy available in fossil fuel, about two-thirds are lost at the power plant and through transmission, with the

remaining one-third of the energy available for end-use by the consumer. Electricity is measured in kilowatt hours (3,413 Btu/kWh at point of use).

Energy Consumption

Supply

In 1989, 590.6 million barrels of petroleum products were supplied to California. Unleaded gasoline continually represents the largest component of petroleum products supplied at 41.9 percent. California's oil supply is provided almost equally from in-state and Alaska production and is expected to decline slowly over the next 20 years, forcing the State to import foreign oil to make up the difference and to meet increasing demand.[2] California Clean Air Act specifications will require reformulation of fuels to meet low-sulfur, low aromatic requirements, increasing availability for consumers.

Pacific Gas & Electric Company (PG&E) services 94,000 square miles of northern and central California, providing electricity and natural gas. PG&E is dependent on a variety of energy sources to meet its energy demands. Table 4.7-1 shows the sources and volumes of electricity and natural gas produced by PG&E in 1989. In 1989, PG&E operated with a net peak electrical capacity of 19,179 megawatts (MW) and maintained a reserve margin of 8.8 percent above the peak demand.[3]

Since 1987, 3,600 MW of new capacity has been added to California's supplies, and construction of an additional 3,000 MW of capacity has been avoided through energy conservation.[4] Electricity consumption in California is expected to rise steadily in the next decade. The major concerns regarding future electricity supplies are the replacement or refurbishment of power plants and mounting environmental concern about the use of fossil fuels to generate electricity.

California produces about 20 percent of the natural gas it consumes. While natural gas is plentiful in North America, the gas pipeline transportation system presents the greatest problem in predicting resource potential. California's interstate pipeline capacity is expected to be adequate through 1993 for any incremental demand. For the year 2000, additional pipeline capacities are likely to be required to serve demand levels.[5]

TABLE 4.7-1

SOURCES OF ENERGY SUPPLIED BY PG&E IN 1989

Electricity	kWh (in millions)	MBtu[1] (in millions)	% of Total
Generated:			
Hydroelectric Plants:	10,804	111	7.4
Thermal-electric Plants:			
Fossil Fueled	25,756	263	17.6
Geothermal	8,054	82	5.5
Nuclear	15,812	162	10.8
Total Thermal Electric Plants	50,314	507	33.9
Wind Plants	–	–	–
Received from Other Sources:	39,408	403	26.9
Total Gross System Output	95,393	1,020	68.1

Gas	Mcf[4] (in thousands)	MMBtu[2] (in millions)	% of Total
Purchased:			
From California:	210,116	221	14.7
From other states:	101,309	106	7.1
From Canada:	144,233	151	10.1
Total Purchased	455,658	478	31.9
Grand Total		1,500	

[1] MMBtu - An abbreviation for one million Btu's for petroleum and gas applications.
[2] MBtu - An abbreviation for one million Btu's in electrical usage.
[3] Includes energy supplied through PG&E's system by the City and County of San Francisco for San Francisco's own use and for sale by San Francisco to its customers, by the Department of Energy for government use and sale to its customers and by the State of California for California Water Project pumping.
[4] Mcf - Million cubic feet.

Source: Securities and Exchange Commission, Form 10-K For the Fiscal Year Ended December 31, 1989, Pacific Gas & Electric.

Natural gas has attracted the interest of air quality planners because it burns cleaner than gasoline, diesel or methanol, emitting 50 percent less carbon monoxide, 30 percent fewer nitrogen oxides, and 25 percent less carbon dioxide in motor vehicles. Natural gas emits almost none of the particulate soot emitted by diesel fuel.[6] Last March, PG&E opened the State's first public fueling station for natural gas vehicles (NGVs) in Concord. The company also has other private stations around the Bay Area. These PG&E dispensers are used by fleet vehicles that have contracted with PG&E for natural gas service. PG&E plans that any NGV will be able to refuel there in the future.

Demand

Oil supplies approximately 57 percent of California's energy. Industry depends on oil for approximately one-third of its energy consumption. Transportation depends on oil for almost 100 percent of its energy.[7]

California's transportation system is the biggest energy end use in the State, consuming approximately 50 percent of the State's total energy. In the year 2004, on-road vehicles are projected to consume approximately 80 percent of California's transportation energy demand, a 10 percent increase from current demand.[8] Cars, trucks, and buses account for nearly all of the on-road fuel consumption, 90 percent of which is gasoline.[9]

California's transportation activity is expanding faster than its population, and the rate of improvement in vehicle fuel economy has slowed. Lack of interest in increased fuel economy, the continued focus on the private automobile as the primary form of transportation, inadequate use of mass transit and other alternative forms of transportation, and increasing urban sprawl will continue to threaten California's fuel supply, unless steps are taken to improve transportation efficiency in the near future. Some of the strategies to address the problems in transportation growth and demand for petroleum fuels include improved fuel economy, increased use of alternative fuels, the use of alternative modes of transportation, and changes in land use patterns.

Table 4.7-2 reflects energy consumption of natural gas and electricity in the PG&E service area in 1989 for a variety of different classes of service, including public transit. Typical end-use consumption patterns for these consumers are identified in Table 4.7-3. Natural gas accounts for

TABLE 4.7-2

NATURAL GAS AND END-USE ELECTRICAL ENERGY CONSUMPTION IN THE PG&E SERVICE AREA IN 1989

Class of Service	Customers	kWh (in millions)	MBtu[1] (in millions)	% of Total
Electricity				
Residential	3,532,306	22,845	221	18.9
Commercial[2]	429,973	24,723	253	20.5
Industrial	1,185	16,222	166	13.4
Agricultural	97,980	3,898	40	3.2
Public St. & Highway Lighting	14,624	366	4	0.3
Other Electric Utilities	18	1,712	18	1.4
Total	4,076,086	69,766	714	57.8

Class of Service	Customers	Mcf (in thousands)	MMBtu[1] (in millions)	% of Total
Gas				
Residential	3,144,667	210,116	221	17.9
Commercial	192,303	101,309	106	8.6
Industrial	2,116	144,233	151	12.3
Other Gas Utilities	15	41,551	44	3.5
Total	3,339,101	497,209	522	42.2
GRAND TOTAL			1,236	100.0

[1] MMBtu - An abbreviation for one million Btu's for petroleum and gas applications.
[2] MBtu - An abbreviation for one million Btu's in electrical usage.
[3] Commercial service includes public transit.

Source: Securities and Exchange Commission, Form 10-K For the Fiscal Year Ended December 31, 1989, Pacific Gas & Electric.

TABLE 4.7-3

TYPICAL END-USE ENERGY CONSUMPTION
IN PG&E SERVICE TERRITORY

END USERS

Residential	Electrical	Gas	PG&E
Space Heating	9%	47%	36%
Space Cooling	7%	6%	4%
Water Heating	7%	37%	18%
Refrigerators/Freezers	26%	–	12%
Lighting/Small Appliances	25%	–	15%
Other	26%	10%	15%
Total	100%	100%	100%
Commercial			
Space Heating	3%	39%	18%
Space Cooling	20%	5%	21%
Water Heating	–	11%	3%
Refrigeration	10%	–	7%
Lighting	41%	–	37%
Ventilation	12%	–	6%
Other	13%	45%	8%
Total	100%	100%	100%

Sources: California Energy Commission, Electrical and Gas End Uses from the Conservation Report, October 1988.

California Energy Commission, PG&E Residential and California Commercial End Use from the Local Energy Planning Handbook, November 1981.

approximately 31 percent of California's total energy use.[10] Natural gas consumption is expected to increase through the year 2000 due to increased use as a low-emission fuel.[11]

Electricity use is growing slightly faster than the population is increasing, as more electric-powered appliances and equipment are added to homes and businesses. Research conducted on the PG&E service territory found some major energy trends in residential energy use.[12] These trends include a substantial rise in electricity consumption and movement away from natural gas usage.

Under the new California Air Resources Board specifications, two percent of all new cars sold by major car makers in the State must run on electricity in 1998 and 10 percent in 2003.[13] Electric vehicles cost about half as much to run as those fueled by gasoline. At this point, electric-powered vehicles are most convenient for fleets that return to central refueling points.[14]

While energy conservation efforts are reducing the amount of energy wasted, the growth in transportation, appliance use and population will all result in increased energy demand through the year 2000. Savings from energy efficiency could come from market impacts (i.e., customer response to energy prices and private market decisions) and State and local energy efficiency programs and utility system improvements.

The demand for Compressed Natural Gas (CNG) for vehicle fuel is expected to increase in the near future as regulators encourage its use with clean fuel vehicles. However, there are a number of problems associated with CNG which would inhibit widespread use as vehicle fuel. CNG is a suitable vehicle fuel that is inexpensive and low-emitting, however CNG engines have less power than gasoline engines. The major constraints on CNG for vehicle fuel are retrofit vehicle conversion costs, refueling, and storage requirements. PG&E plans to work with those who want on-site refueling equipment and to offer rebates to qualifying fleet owners who convert their vehicles to natural gas, pending regulatory approval. Again, NGVs are most suited for fleet vehicles that return to central refueling points.[15]

In the future, there will be greater demand for development of non-fossil alternatives that are even cleaner then natural gas, in addition to improving combustion efficiencies and emission control technologies. Natural gas may be a short term solution to petroleum dependence, but it is not the

long term solution. Natural gas is sold in therms and sells at the equivalent of approximately 70 cents per gallon.[16]

Alternative, Low-Emission Fuels

In 1989, the California Energy Commission prepared a report on the expected availability and price of methanol and other clean-burning fuels for use in "low-emission" vehicles. The report includes assumptions based on the recently amended federal Clean Air Act and predicts adequate resources of methanol, ethanol, natural gas, and electricity, through the year 2000.[17]

Methanol is a liquid fuel that can be made from wood, coal, petroleum, and natural gas, but is currently produced at the lowest cost using natural gas. Methanol has been shown to emit less reactive or lower emissions of most pollutants. Because methanol is produced almost exclusively from natural gas, it will compete with other natural gas markets, and production efficiency will become increasingly important. Current technologies to improve production efficiency include production through partial oxidation of natural gas.[18] Nationally, methanol demand by the year 2,000 may require at least two more 10,000 metric-ton-per-day methanol production facilities.[19] Considering the technical problems associated with retrofit methanol vehicles, large quantities of methanol compatible vehicles would have to be produced before a major switch to methanol fuel would occur.[20]

Since ethanol typically costs more to produce than methanol, State programs have concentrated their interests in alcohol fuels on methanol, as a direct substitute for gasoline and diesel fuel. Both methanol and ethanol are also used as gasoline additives to replace lead and other less desirable octane additives and to extend gasoline supplies.[21]

Liquified petroleum gas (LPG), propane or butane, could also serve as an alternative fuel. While offering lower fuel costs and lower emissions, LPG could potentially serve as much as 10 percent of the gasoline market.[22] LPG has a limited production level in California. LPG is a by-product of oil and natural gas recovery and processing, and its future availability will be linked with these activities.[23]

IMPACTS AND MITIGATION MEASURES

Basis For Impacts

There is an integral relationship between the CAP and energy conservation. Energy efficiency is inherent in the CAP mobile and stationary source control measures. In general, the Mobile Source Control Measures deemphasize the use of automobiles and reduce fuel consumption. Energy efficiency was also one of the major criteria used in developing the Candidate Mobile Source Control Measures.[24] Similarly, use of the pollution control devices required or encouraged by the Stationary Source Control Measures would be reviewed and approved by the BAAQMD according to their ability to promote energy efficiency, following implementation of measure F3. Implementation of the CAP is expected to decrease automobile vehicle miles travelled (VMT) and encourage use of alternative transit. While fuel consumption would decrease dramatically and electricity and natural gas consumption would increase sightly, the result would be a significant decrease in the total energy resources allocated and consumed for transportation needs in the Bay Area. As discussed below, the CAP would also increase demand for alternative energy sources by requiring certain fleet vehicles to be clean-fuel vehicles. As described above, the resources are available to meet the anticipated demand and both regulatory and market-based influences would induce suppliers to meet projected needs. Certain stationary source control measures would increase use of pollution control devices and the consumption of energy produced from non-renewable fossil fuels. This effect would be offset partially or completely by implementation of measures to increase energy efficiency and increase the overall reduction in energy consumption related to automobiles.

Standards of Significance

According to the California Environmental Quality Act (CEQA), a project would have a significant energy effect if it would "encourage activities which result in the use of large amounts of fuel or energy" or if the project would "use fuel or energy in a wasteful manner." For this project significant energy effects are evaluated based whether or not the proposed CAP control measures would use energy in an efficient manner, encourage activities that would result in the use of large amounts of energy, exceed the capacity of energy suppliers based on existing and planned capacities, or require the development of new energy resources. All impacts are significant adverse impacts unless otherwise noted.

Mobile Source Control Measures

Impacts from Employer-Based Trip Reduction Measures

Impact

4.7-1 **Implementation of TCM 1 and TCM 2 would reduce VMT and increase commuter use of alternative modes of transit. This would be a beneficial energy effect.**

Table 4.7-4 lists the energy consumption by passenger modes in Btu/passenger mile. As the table indicates, the alternative modes of transit (car pool, van pool, urban bus, rail transit, bicycle, and walking) recommended by the CAP mobile source control measures would all result in substantial energy savings when compared to the automobile. Implementation of these control measures would substantially reduce the total energy resources allocated and consumed for transportation.

Mitigation Measure

4.7-1 *None recommended or required.*

Impact

4.7-2 **Implementation of TCM 1 and TCM 2 would reduce VMT and increase vehicle speeds. This is a potentially beneficial energy effect.**

Figure 4.7-1 shows the relationship between fuel consumption and vehicle speed. Mobile source control measures that increase speeds up to 35 miles per hour (mph) would save fuel consumption because vehicles consume fuel most efficiently at approximately 35 mph. Fuel efficiencies increase from 0 to 35 mph and decrease less dramatically from 35 to 65 mph. Average speeds in the Bay Area during peak-hour traffic are estimated at 15 to 20 mph.[25] Increasing speeds to 35 to 50 mph or above would be more fuel efficient. Therefore, these control measures would result in energy saving impacts.

Mitigation Measure

4.7-2 *None recommended or required.*

TABLE 4.7-4

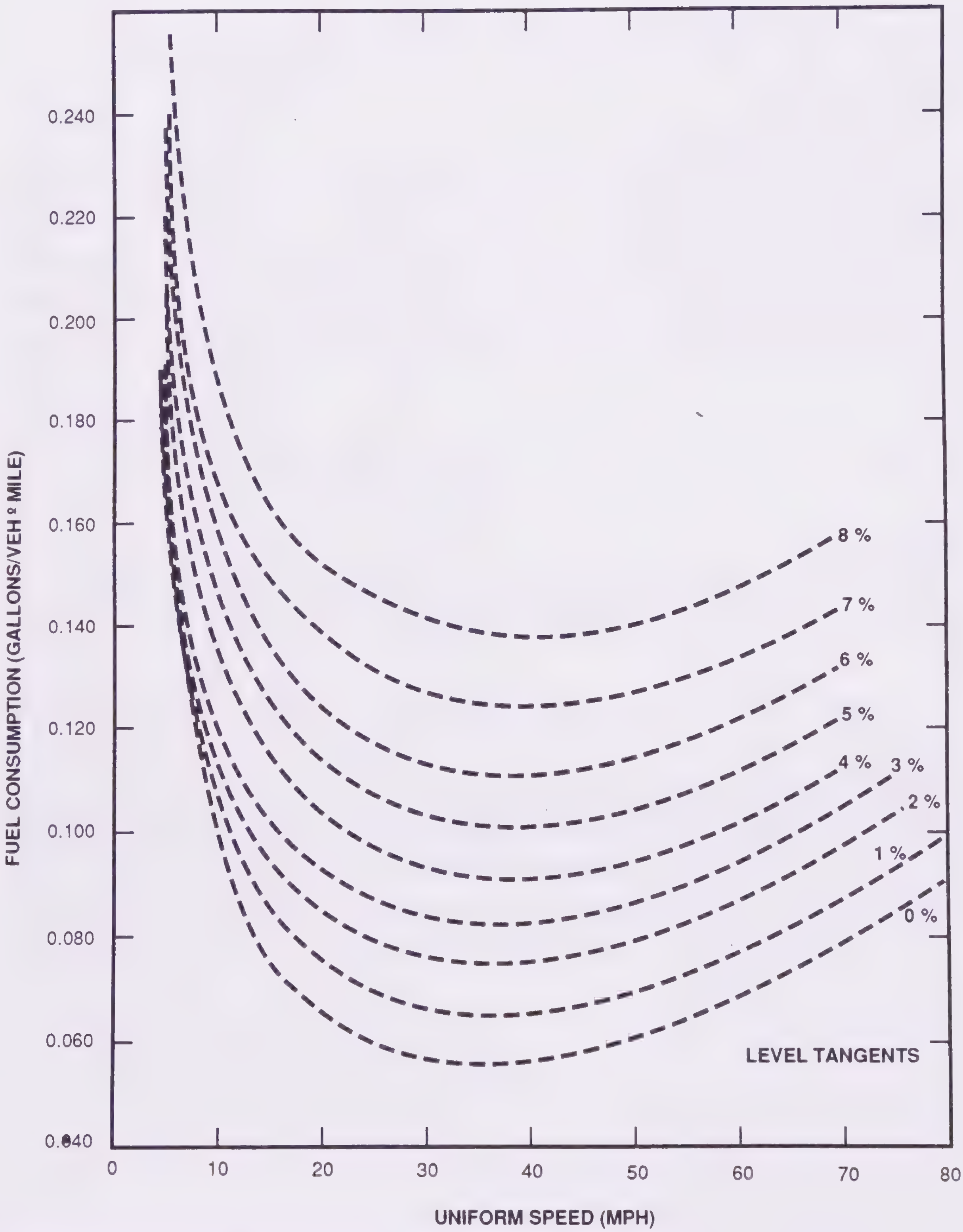
ENERGY CONSUMPTION BY PASSENGER MODES

Mode	Btu/Passenger Mile
Auto (general average)	5,600 - 8,100
Small car (all trip purposes)	2,620
Work and related business	5,770
Shop and family business	3,020
Social and recreation	1,670
Standard car (all trip purposes)	5,100
Work and related business	7,970
Shop and family business	6,040
Social and recreation	2,970
Car pool	3,670
Van pool	1,560
Taxi	15,600
Bus	
Urban	2,680 - 3,700
Dial-a-bus	9,690
Rail	
Rapid	1,650 - 4,300
Commuter	2,490
Light	3,750
Motorcycle	1,100 - 1,600
Bicycle	100 - 200
Walking	300 - 500

[1] John W. Dickey, Metropolitan Transportation Planning, McGraw-Hill Book Co., 1983, Table 8.1.
[2] Wolfang S. Homburger and James H. Kell, Fundamentals of Traffic Engineering, Institute of Transportation Studies, University of Berkeley, 1988, Table 32-1.

TOTAL AUTOMOBILE FUEL CONSUMPTION FOR VARIOUS PLUS GRADES

FIGURE 4.7-1



METROPOLITAN TRANSPORTATION PLANNING, JOHN W. DICKEY, 1983, HEMISPHERE PUBLISHING CORPORATION

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Impacts from Mobility Improvements

Each of these control measures is expected to increase mobility. TCMs that involve construction of transit lines or improvements may have energy impacts during construction.

Impact

4.7-3 **Implementation of TCMs 3, 4, 5, 7, 8, and 9 would utilize energy for construction. This would be a potentially significant energy impact.**

These control measures would encourage construction of new and improved transit facilities. Energy would be consumed in construction, primarily by construction equipment required in the demolition and construction activities. Indirectly, energy would be consumed in the processing of construction materials. Currently the projects associated with these TCMs are not sufficiently defined to allow an assessment of the energy intensiveness of construction. Among construction practices which are known to be energy intensive are demolition and excavation. Significant impacts would occur if energy consumed during construction was utilized in a wasteful manner.

Mitigation Measure

4.7-3 *During subsequent CEQA review, local government agencies, transit operators, Caltrans, and MTC (where appropriate) would conduct an analysis of construction alternatives for each proposed project that would evaluate the energy demand so that suggestions could be made regarding the least energy intensive methods. These factors would determine whether or not the projects would be designed to use nonrenewable energy in an efficient manner. Implementation of these mitigation measures would reduce this impact to a less than significant level.*

Impact

4.7-4 **Operation of new alternative transit lines would consume energy. This is a less than significant impact.**

See discussion under Impact 4.7-1. However, energy savings from increased mass transit ridership may be partially offset if operation of each individual project does not result in the most efficient use of energy.

Mitigation Measure

4.7-4 *During CEQA review, project-specific energy analysis would be conducted to evaluate the energy efficiency of the project and determine whether additional conservation mechanisms are available to reduce energy consumption. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.7-5 **Implementation of the mobility improvements would reduce VMT and increase commuter passage on alternative modes of transit. This would be a beneficial energy effect.**

See discussion under Impact 4.7-1.

Mitigation Measure

4.7-5 *None recommended or required.*

Impact

4.7-6 **Implementation of the mobility improvements would reduce commuter vehicle trips and increase vehicle speeds. This would be a beneficial energy effect.**

See discussion under Impact 4.7-2.

Mitigation Measure

4.7-6 *None recommended or required.*

Impacts from Traffic Operation Management Control Measures

Impact

4.7-7 **Implementation of TCMs 11 and 12 would increase average vehicle speeds on freeways and arterials. This would be a potentially beneficial energy effect.**

See discussion under Impact 4.7-2. Energy effects on major Bay Area arterials are expected to be similar to the effects on freeways.

Mitigation Measure

4.7-7 *None recommended or required.*

Impacts from User Incentives

Impact

4.7-8 **Each of the User Incentive Control Measures (TCMs 13, 14, and 15) would reduce VMT and increase ridership on alternative modes of transit. This would be a beneficial energy effect.**

See discussion under Impact 4.7-1.

Mitigation Measure

4.7-8 *None recommended or required.*

Impact

4.7-9 **Implementation of TCMs 13, 14, and 15 would reduce VMT and increase vehicle speeds. This would be a potentially beneficial energy effect.**

See discussion under Impact 4.7-2.

Mitigation Measure

4.7-9 *None recommended or required.*

Impacts from Indirect Source Review Measures

Impact

4.7-10 **The Indirect Source Review control program would encourage energy-saving developments in the Bay Area. This is a beneficial energy effect.**

The Indirect Source Review control program would review projects that attract vehicle trips. This program would result in energy savings by promoting developments that minimize auto dependence (e.g., high-density housing near transit).

Mitigation Measure

4.7-10 *None recommended or required.*

Impacts From Implementation Support Measures

The Implementation Support Control Measures are designed to encourage planning that would benefit air quality and to promote public education. TCM 18 may have energy impacts. Altered land use patterns encouraged by TCM 18 would lower per unit household energy consumption due to increased density. TCM 18 would also provide an overall reduction in transportation fuel consumption.

Impact

4.7-11 **Implementation of TCM 18 would result in high-density residential development. This would be a beneficial energy effect.**

Buildings and appliances associated with proposed project would be required to comply with State Title 24 energy standards and, therefore, would not be found to consume energy in a wasteful manner. In addition, energy consumption per capita would likely be less in higher-density housing structures, e.g., air conditioning, heating, and outdoor lighting. Therefore, while energy demand would increase, building energy consumed as a result of the TCM 18 would not result in a wasteful use of energy. Without TCM 18, housing would likely be developed elsewhere in a less energy efficient manner, e.g., low density.

Mitigation Measure

4.7-11 *None recommended or required.*

Impact

4.7-12 **Implementation of TCMs 17, 18, 19, and 20 all encourage modes of transportation that are alternatives to the automobile. These measures would have a beneficial energy impact.**

See discussion under Impact 4.7-1.

Mitigation Measure

4.7-12 *None recommended or required.*

Impact

4.7-13 **Implementation of TCMs 17, 18, 19, and 20 would reduce VMT and increase vehicle speeds. This would be a beneficial energy effect.**

See discussion under Impact 4.7-2.

Mitigation Measure

4.7-13 *None recommended or required.*

Impacts Related to Ozone Excess "No Drive Days"

Impact

4.7-14 **Implementation of G3 and Contingency Measure G4 would encourage modes of transportation that are alternative to the automobile. These measures would have a beneficial energy impact.**

See discussion under Impact 4.7-1. Beneficial impacts through energy conservation would be intermittent since G3 is voluntary and G4 is a contingency measure.

Mitigation Measure

4.7-14 *None recommended or required.*

Impact

4.7-15 **Implementation of G3 and Contingency Measure G4 would reduce VMT and increase vehicle speeds. This would be a potentially beneficial energy effect.**

See discussion under Impact 4.7-2.

Mitigation Measure

4.7-15 *None recommended or required.*

Impacts Related to Motor Vehicle Control Measures

Impact

4.7-16 **Implementation of Contingency Measure H2, "High Polluting Vehicle Retirement Program," would improve fuel efficiency through replacement of older vehicles. This would be a beneficial energy effect.**

This contingency measure would establish a buy-back program which replaces old vehicles with post-1981 model vehicles. Post-1981 vehicles have improved fuel efficiency compared to older vehicles. This would be a beneficial energy effect.

Mitigation Measure

4.7-16 *None recommended or required.*

Impact

4.7-17 **Implementation of H3 could increase demand among certain fleet operators to purchase and operate clean fuel vehicles. This would be a significant impact.**

H3 encourages the use of clean-fuel vehicles or very low-emitting gasoline powered vehicles and would somewhat reduce the Bay Area's dependance on non-renewable energy sources for transportation. The use of LPG as a vehicle fuel would still require the burning of fossil fuels. Electric vehicles would require less fossil fuel consumption than gasoline or diesel vehicles. Electric vehicles, consuming approximately 1,860 Btu/mile, are more energy efficient than petroleum powered vehicles, which can consume up to 8,100 Btu/mile.[26] Similarly, methanol and ethanol vehicles would require less consumption of nonrenewable natural resources, although these engine

types are less fuel efficient and would likely use more fuel than petroleum fueled engines. The overall number of Btus/passenger-mile may increase for clean fuel vehicles due to less efficient engine types. Therefore, this measure may create a significant energy impact.

Given the existing supply system, methanol can only be expected to make a limited contribution to fuel supply. Depending on the breadth of increased methanol use in the Bay Area and other parts of California, expanded methanol supply facilities would be required to increase production capacity and create a significant energy impact. Though pipelines are the major limiting factor in natural gas supply, it is anticipated that additional gas demands over the next decade could be met. LPG supplies would also be available through the year 2000.

Mitigation Measure

4.7-17 *Technologies are being developed that would reduce the energy loss due to combustion inefficiencies. However compared to petroleum, these engines would still be less efficient in the next decade. New methanol resources may need to be developed due increased demand.*

This would be a significant and unavoidable impact.

Impact

4.7-18 **Implementation of Contingency Measure H4 would require urban transit buses operating along major fixed routes to install overhead trolley wires for power transmission. This would be a beneficial energy effect.**

Currently, there are approximately 250,000 urban bus vehicle miles travelled daily. It is expected that around 30 percent of the routes in the Bay Area would qualify for conversion. Electric vehicles, consuming approximately 1860 Btu/mile (including transmission losses), are more energy efficient compared to traditional vehicles that burn gasoline or diesel, consuming up to 8,100 Btu/mile. If 30 percent of the Bay Area bus routes were converted to electricity, this would be a beneficial energy impact.

Mitigation Measure

4.7-18 *None recommended or required.*

Impacts from Market-Based Transportation Control Measures

Impact

4.7-19 **Implementation of market-based control measures would reduce total VMT in the Bay Area and increase usage of alternative modes of transit. This would be a beneficial energy effect.**

See discussion under Impact 4.7-1.

Mitigation Measure

4.7-19 *None recommended or required.*

Impact

4.7-20 **Implementation of market-based control measures would reduce VMT and increase vehicle speeds. This would be a potentially beneficial energy effect.**

See discussion under Impact 4.7-2.

Mitigation Measure

4.7-20 *None recommended or required.*

Stationary Source Control Measures

Impacts from Surface Coatings and Solvent Use Control Measures

Impact

4.7-21 **Implementation of A7, A9, A11, A13, A14, A15, and A16, may result in the use of additional pollution control devices that consume energy. This would be a potentially significant energy impact.**

In most cases, the "add-on" pollution controls would include incineration and/or carbon adsorption. Incineration techniques utilize natural gas and carbon adsorption utilizes electricity. Installation of the pollution control equipment may result in a net energy penalty for those industries affected.

The resources to accommodate these facilities are available, although it is unknown whether these devices would operate in an efficient manner.

Mitigation Measure

4.7-21 *Pollution control devices would be reviewed and approved based on energy efficiency standards developed under F3, "Promotion of Energy Efficiency." Implementation of this mitigation measure would reduce this impact to a level of insignificance.*

Impact

4.7-22 **Implementation of A7 would result in additional use of radiation-curing systems for can and coil coating. This would be a beneficial energy effect.**

Radiation curable coating systems use 75 to 90 percent less energy than conventional thermal-curing systems.

Mitigation Measure

4.7-22 *None recommended or required.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.7-23 **Implementation of B1, B2, and B6 may require vapor recovery systems, which use energy. This would be a potentially significant impact.**

Mitigation Measure

4.7-23 *See Mitigation Measure 4.7-21. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impacts from Refinery and Chemical Processes Control Measures

Impact

4.7-24 **Implementation of C1, C4, and C7 would require recovery systems for emissions control that would use energy. This would be a potentially significant impact.**

Mitigation Measure

4.7-24 *See Mitigation Measure 4.7-21. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impacts from Combustion of Fuels (NO_x) Control Measures

Impact

4.7-25 **Some facilities may choose electrification as the option for compliance with D1. This would be a potentially significant impact.**

This option would create an additional demand for electricity, although the energy would not necessarily be used in a wasteful manner. Further, at those facilities opting for electrification, there would be decreased demand for other fuels, e.g., natural gas.

Mitigation Measure

4.7-25 *Pollution control devices would be reviewed and approved based on energy efficiency standards developed under F3, "Promotion of Energy Efficiency." Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.7-26 **Implementation of D6 would result in increasing the electrical boost at some glass manufacturing facilities. This is a potentially significant impact.**

Use of electrical boost for supplemental heating would increase demand for electric power generated at power plants. This would decrease the amount of natural gas that is normally used to fuel furnaces. The net energy impact is unknown.

Mitigation Measure

4.7-26 *See Mitigation Measure 4.7-21. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.7-27 **Implementation of measures E1 and E3 may result in the use of additional pollution control devices that consume energy. This would be a potentially significant energy impact.**

Mitigation Measure

4.7-27 *See Mitigation Measure 4.7-21. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.7-28 **Implementation of E3 would result in increased use of grooved griddles, which require less ventilation than charbroilers. This would be a beneficial energy effect.**

Ventilation requires electrical energy consumption. Reducing ventilation would reduce energy demand and consumption.

Mitigation measure

4.7-28 *None recommended or required.*

Impacts from Other Stationary Sources Control Measures

Impact

4.7-29 **F1, Contingency Measure F2, and F4 would all encourage increased use of pollution control equipment that would utilize energy. This would be a potentially significant impact.**

Mitigation Measure

4.7-29 *See Mitigation Measure 4.7-21. Implementation of this measure would reduce this impact to a less than significant level.*

Impact

4.7-30 **F3, "Promotion of Energy Efficiency" would establish a goal of increasing energy efficiency within the District by a specified amount. This would be a beneficial energy effect.**

This control measure attempts to integrate energy efficiency with emissions reductions from various types of equipment: residential, commercial, and industrial. At the time of this writing, this control measure is in the conceptual stage. It would first require a review of many types of equipment used in residential, commercial and industrial settings. From this evaluation stage, individual rules regarding energy efficiency can be developed, for those types of equipment having the most promising emission reduction possibilities. Implementation of this control measure would also mitigate implementation of other control measures which may require additional energy demand and may utilize energy in a wasteful manner.

Mitigation Measure

4.7-30 *None recommended or required.*

Impacts from Intermittent Transportation Control Measures

Impact

4.7-31 **Implementation of G1 and G2 would result in temporary, decreased use of devices that consume energy. This would be a beneficial energy effect.**

This would be a beneficial effect only if the activity was completely forgone rather than only postponed in which case there would be no effect on energy consumption.

Mitigation Measure

4.7-31 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

The CAP encourages energy efficiency through most of the mobile source control measures. These measures would have beneficial energy impacts as described above, and cumulative beneficial energy effects as more of these measures were implemented over the next decade. In general, the Mobile Source Control Measures deemphasize the use of passenger automobiles and reduce fuel consumption. Energy efficiency was also one of the criteria used in developing these measures. Implementation of H3, which may require certain fleet operators to operate clean fuel vehicles, would not have cumulative adverse impacts because as more clean fleet vehicles are developed and tested, engines will likely become more efficient. Electric vehicles, which are more efficient than traditional petroleum fueled vehicles, would have cumulative beneficial energy effects as more electric vehicles were used. On the other hand, the cumulative impacts of methanol supply and demand may be significant.

Stationary Source Control Measures

As described above, certain stationary source control measures would increase use of pollution control devices that consume energy produced from non-renewable fossil fuels. The cumulative impacts of additional consumption would be offset partially or completely by implementation of measures to increase energy efficiency.

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3. Securities and Exchange Commission, Form 10-K, For Fiscal Year Ended December 31, 1989, Pacific Gas and Electric, pg. 14.

4. California Energy Commission, Energy Agenda, op. cit.

5. California Energy Commission, AB 234 Report: Cost & Availability of Low Emission Motor Vehicles and Fuels, August, 1989, p. 13.

6. PG&E, Progress Newsletter, March, 1991.

7. California Energy Commission, Conservation Report, October, 1988.

8. California Energy Commission, California Transportation Energy Demand: 1984-2004, April, 1985, p. 2.

9. Ibid, pp. 13-14.

10. California Energy Commission, Conservation Report, op. cit.

11. California Energy Commission, Energy Agenda, op. cit.

12. RER, Energy-Related Differences in Old and New Homes in the PG&E Service Territory, June, 1986, p. 1.

13. PG&E, op. cit.

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15. M. Kim, T. Perardi, Bay Area '91 Clean Air Plan (CAP), Issue Paper #8, "Mobile Source Emissions - Vehicle Standards, I&M, Alternative Fuels," April 1, 1990.

16. PG&E, op. cit.

17. California Energy Commission, AB:234 Report, op. cit.

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19. California Energy Commission, AB 234 Report, op. cit.

20. M. Kim, T. Perardi, Bay Area '91 Clean Air Plan, op. cit.

21. California Energy Commission, Energy Agenda, op. cit.

22. Ibid, p. 29.

23. Ibid, p. 28.

24. Bay Area Air Quality Management District, Association of Bay Area Governments, Metropolitan Transportation Commission, Bay Area '91 Clean Air Plan (CAP), Draft, March 1991, p.44

25. Bay Area Economic Forum, "Market-Based Solutions to the Transportation Crisis: The Theory," February 1990, p. 10.

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4.8 BIOLOGICAL RESOURCES

This section discusses the potential impacts of the Clean Air Plan on flora and fauna in the Bay Area. These include the direct impacts of air pollutant reductions and the indirect impacts resulting from transit facilities construction and changes in land use.

SETTING

Overview of Plant Communities in the District

The nine-county San Francisco Bay Area supports a diversity of native and non-native plant communities. In many cases, these communities are not distinct, and frequently two or more plant communities coexist in the same area. The principal plant communities in the San Francisco Bay Area are discussed below.

Coastal Zone Communities

Along the immediate coastline, within the San Francisco Bay and inland a mile or two, the most common native plant communities are the rocky shore, coastal dunes (strand), coastal salt marsh, coastal scrub, and coastal prairie. The rocky shore and coastal salt marsh communities are subject to tidal action. The salt marsh community is recognized as a valuable natural resource, important as natural wildlife habitat and for water quality purification in the ecology of the California coastline. All of these coastal zone communities are of rather limited extent in the San Francisco Bay Region and thus are recognized as valuable natural habitats.

Valley Communities

The following plant communities are common in the valleys in the Bay Area: redwood forests in some of the coastal valleys; grasslands in the more inland valleys and in the Great Central Valley in the eastern portions of Contra Costa, Alameda and Solano Counties; and riparian woodlands and freshwater marshes along natural watercourses. The riparian woodlands, freshwater marshes, and redwood forests are native plant communities of limited extent and high wildlife value. The most common grasslands in the area and throughout California are the naturalized non-native or annual grasslands, which are dominated by grasses and forbs (broad-leaved herbaceous plants) from other regions of the world with Mediterranean climates (such as north Africa, Europe, and South

America). There are scattered remnants of the native perennial grasslands throughout the Bay Area, particularly in Napa, Alameda, Solano, Marin, and Contra Costa counties.

Forest Communities

The slopes and canyons of the various hills and mountain ranges in the Bay Area support a variety of tree forest communities. The closed-cone pine forest community occurs from near sea level to approximately 1,200 feet along the immediate coastline in Marin, Sonoma, and San Mateo Counties. Two examples of this type of forest community are the Monterey pine (*Pinus radiata*) forest at Ano Nuevo Point in southern San Mateo County and the Bishop pine (*P. muricata*) forest in western Marin County. Both of these forest communities are relatively rare in the State. The Douglas Fir (*Pseudotsuga menziesii*) forest occurs in the same coastal regions as the closed-cone forest, but it is much more abundant in the region and in the State. The Ponderosa pine (*Pinus ponderosa*), or yellow pine, forest is limited to scattered patches in Napa County (Howell Mountain area) and eastern Santa Clara County. This forest community is common elsewhere in the State. The broad-leaf evergreen forest is one of the more common forest types in the Bay Area occurring at elevations from 200 to 2,500 feet.

Oak Woodlands

There are a wide variety of oak woodland communities in the inner coastal ranges from 400- to 3,000-foot elevations. At the lower elevations are the valley oak (*Quercus lobata*) and coast live oak (*Q. agrifolia*) woodlands. The valley oak woodlands typically occur in broad valley floors with deep soils. This particular woodland type is of limited extent throughout the State and is of some concern to the California Department of Fish and Game. Blue oak (*Q. douglasi*) woodlands are found at the higher elevations of the Vaca and Diablo Mountain Ranges in shallow soils. As with the valley oak woodland, there is some concern about the natural regeneration and continued existence of this woodland type in the region.

Brushlands

The most common brushland in this region is chaparral, which typically occurs on the dryer slopes and ridges of the inner coastal ranges throughout the Bay Area.

Urban and Agricultural

The greatest urban centers in the Bay Area are adjacent to the San Francisco Bay in the coastal valleys and hills of San Francisco, Santa Clara, Alameda, and Contra Costa Counties. These highly urbanized areas have few remaining native plant communities and support a variety of non-native landscaping. Some of these landscape plant species have invasive and weedy characteristics that threaten some of the surrounding native plant communities. One such species is pampas grass (*Cortaderia selloana*), which is invading the coastal dune habitats. Agricultural lands occur throughout the Bay Area but are centered in the northern counties and in the eastern portions of Contra Costa and Alameda Counties. As urban development pressures increase, more and more of these agricultural lands and native habitats will be converted to urbanized areas.

Overview of Wildlife Species in the District

The nine counties of the Bay Area support a wide diversity of wildlife habitats. The wildlife habitats in the Bay Area listed below correspond to those described by the State of California.[1] A brief description of each of the wildlife habitats in the Bay Area follows, and the vegetation communities associated with each of the wildlife habitats are identified in parentheses.

Marine (Rocky Shore)

The marine habitats are used almost exclusively by seven species of marine mammals and 31 pelagic birds. Other species that make extensive use of this habitat include shore and wading birds, gulls, terns, sea ducks, and ospreys.

Saline Emergent Wetland and Estuarine (Coastal Salt Marsh)

This habitat provides feeding, nesting, resting, and cover habitat for a large number of mammal and bird species. The salt marshes of the San Francisco Bay and the smaller estuaries of the coastline are critical to the continued existence of a number of wildlife species. The loss of this type of wildlife habitat is considered significant.

Coastal Scrub (Coastal Dune and Coastal Scrub)

Little is known about the importance of coastal scrub habitat to wildlife. It does appear to support numbers of vertebrate species roughly equivalent to those in surrounding habitats.

Redwood Forest

Redwood habitats provide food, cover, and special habitat elements for approximately 193 species of wildlife in California. Of these, 18 are game species, and there are a number of sensitive species that utilize this habitat type.

Valley Foothill Riparian (Central Coast Riparian Forest, Riparian Scrub, Riparian Woodland)

This habitat type provides food, cover, water, migration and dispersal corridors, nesting sites, and thermal cover for an abundance of wildlife species. This is one of the most important wildlife habitats in the State.

Annual Grassland

Many wildlife species use annual grassland habitats for foraging. A wide variety of small mammal species nest and live in these grasslands, attracting various carnivorous species such as owls, hawks, coyotes and other larger mammals. Some of these larger wildlife species require special habitat features such as caves, cliffs, ponds, or trees for nesting sites.

Perennial Grassland

This habitat type supports many of the same wildlife species as the annual grasslands habitat type.

Fresh Emergent Wetland (Freshwater Marsh)

This is among the most productive wildlife habitats in California. Approximately 160 species of birds are known to feed and seek cover in this habitat. Many wildlife species rely upon this habitat for their entire life requirements.

Closed-Cone Pine-Cypress (Closed-Cone Pine Forest)

This habitat type is known to support a number of game species. Few species use this habitat type for breeding.

Douglas-Fir Forest

This habitat type supports an abundance of wildlife species. This is among the coastal coniferous forest types that support a bird density greater than any other forest habitat type in North America.

Ponderosa Pine Forest

This habitat type sometimes serves as an important migratory habitat for deer. It is most valuable when it is found in association with riparian zones and brushlands, and in successional stages of development.

Montane Hardwood-Conifer and Montane Hardwood Forests (Broad-Leaf Hardwood Forest)

These habitat types vary a great deal in their tree species composition, canopy cover and understory vegetation contributing to a wide variety of wildlife species. Mature trees provide nesting sites for cavity nesters; mast (seed) crops, such as oak and buckeyes, serve as important food sources for many birds and mammals; and the cool, moist forest floor provides habitat for a variety of amphibian species.

Oak Woodlands (Valley Oak, Coast Live Oak and Blue Oak Woodlands)

Oak woodlands provide habitat for a variety of wildlife species. At least 60 species of mammals and 110 species of birds use oak habitats in California. Populations of many species are dependent upon the seedlings and acorn crop of the oaks. Many game species occur in these habitat types.

Mixed and Chamise-Redshank Chaparral (Chaparral)

The wildlife species typically found in these habitat types are similar to those found in coastal scrub and in the understory of the woodland habitats.

Urban

This habitat type may be broken into three subcategories: downtown, urban residential, and suburban. The diversity and richness of wildlife species is extremely low in the downtown areas. The more varied mosaic created by the vegetation of shade trees, lawns, hedges, and planted gardens characterizes the urban residential zone. The wildlife use of this zone is more varied as

well. Suburban areas provide a closer approximation of the natural environment, with large tracks of undeveloped land within the urban setting.

Orchard-Vineyard and Cropland (Agricultural)

Agricultural lands have been developed on those sites with the deepest and richest soils that once supported some of the finest wildlife habitats in the State. The mono-culture of an agricultural field reduces the habitat diversity of that site and thus the wildlife that can use that site. Some wildlife have adapted to these agricultural uses and may still use these sites on occasion. Various practices lend themselves to use by specific species; for example, the flooding of fields in the fall to control weeds favors the use of the site by wading and dabbling ducks.

Overview of Endangered, Threatened, or Rare Species

There are a number of sensitive plant and animal species known to occur in the Bay Area. For the purposes of this document, a sensitive species is any plant or wildlife species that is listed as either Endangered or Threatened by either the U.S. Department of Interior under the Federal Endangered Species Act (1973) or by the California Department of Fish and Game under the California Endangered Species Act (1984). In addition to those species that have been listed under the two Endangered Species Acts, a sensitive species is also any plant or animal species that is proposed or a candidate for listing under the federal Endangered Species Act, listed as Rare under the California Endangered Species Act, and/or those plant species listed under lists 1A, 1B, or 2 of the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (September 1988).

Using the criteria defined above for the designation of a sensitive species, the number of sensitive plant and animal species in each of the nine counties in the District is listed in Table 4.8-1. Many of these species occur in more than one county. They also tend to occur in native habitats, especially those habitats of limited extent and distribution such as vernal pools, coastal salt marshes, freshwater marshes, and perennial grasslands. A sensitive species may occur anywhere that there are relatively undisturbed natural communities including, occasionally, urbanized areas.

TABLE 4.8-1

NUMBERS OF SENSITIVE PLANT AND ANIMALS SPECIES BY COUNTY[1,2]

County	Plant	Wildlife
Alameda	23	7
Contra Costa	26	7
Marin	46	6
Napa	26	6
San Francisco	16	2
San Mateo	23	10
Santa Clara	20	7
Solano	20	6
Sonoma	52	4

[1] Sensitive = Endangered, Threatened, Rare, under either the Federal or State Endangered Species Acts.
Proposed and Candidate species for listing under the Federal Endangered Species Act.
Plant species under List 1A, 1B or 2 of the California Native Plant Society (1988).

[2] A particular species may occur in more than one County.

Regulatory Framework

Endangered Species Acts

The Federal Endangered Species Act was passed in 1973 to provide protection for animal and plant species that are currently in danger of extinction ("endangered") and those that may become so in the foreseeable future ("threatened"). Section 7 of this Act requires federal agencies to ensure that their actions do not have adverse impacts on the continued existence of threatened or endangered species or on the designated areas (critical habitats) that are important to the conservation of those species. The U.S. Fish and Wildlife Service (FWS) maintains current lists of species that have been designated as threatened or endangered.

The State Endangered Species Act was signed into law in 1984. This law established agency consultation procedures and forbids State agencies from granting approval to projects under CEQA that would jeopardize the continued existence of a listed species. It directs agencies to consult with the California Department of Fish and Game (DFG) to determine whether or not jeopardy will occur; if so, the Department will determine reasonable and prudent alternatives to the project. However, the Act allows agencies to determine overriding considerations to approve the project even if jeopardy is found, but agencies are prohibited from approving projects that would cause the extinction of a species.

Wetlands Regulation and Policy

In general, wetlands are very productive ecosystems that provide habitat for a variety of wildlife, generate organic matter to fuel aquatic food chains, and function as natural flood control and pollution filtration systems. In the East Bay in particular, wetlands provide valuable resting and feeding habitat for migratory waterfowl of the Pacific Flyway and for a variety of migratory and resident shorebirds and waterbirds. In recognition of the economic and ecologic value of wetlands, a regulatory framework has been developed for their protection. Of particular potential relevance to this project would be Section 404 of the Clear Water Act and involvement of the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service and California Department of Fish and Game, as described below.

U.S. Army Corps of Engineers. The Corps of Engineers, a branch of the U.S. Army, exercises final permit authority over projects under the federal River and Harbor Act of 1899, federal Water

Pollution Control Act of 1972 as amended, and related statutes described below. The Corps of Engineers' permit process is initiated once a project has received all local governmental approvals, including certification of the project's environmental documents by local agencies. Its permit process solicits comments and advice from the public and regional, State and other federal agencies, such as the Bay Conservation and Development Commission (BCDC), Regional Water Quality Control Board, California Department of Fish and Game, and the U.S. Fish and Wildlife Service.

Section 404 of the Federal Water Pollution Control Act establishes a permit program, administered by the Corps of Engineers, to regulate the discharge of dredged material and pollutants that comprise fill materials into the "waters of the United States." Jurisdiction over "waters of the United States" extends to the high tide line of tidal waters, plus adjacent or neighboring wetlands.

If it is determined that the Corps of Engineers has jurisdiction over a proposed development project site, the project would be subject to their review to determine whether a Section 404 permit is needed, pursuant to the Clean Water Act. If the permit is needed, the Corps of Engineers would assess, in coordination with the U.S. Fish and Wildlife Service, whether these areas constitute wetlands that perform functions important to the public interest (e.g., wildlife habitat value, floodwater retention, productivity, recharge and other ecological functions). Corps of Engineers' procedures indicate that work permits will not be granted for wetlands that are important to the public interest unless the District Engineer concludes that the benefits of the proposed alteration would outweigh the damage to the wetlands resource and that the proposed alteration is necessary to realize those benefits.

U.S. Fish and Wildlife Service. Under the Fish and Wildlife Coordination Act, the U.S. Fish and Wildlife Service (USFWS) assesses the impacts on fish and wildlife of all water and related land resource development projects that are federally funded or are constructed under a federal permit or license, and provides biological survey reports and recommendations to the appropriate construction or regulatory agency. The service is also consulted specifically before a Section 404 permit is issued by the U.S. Army Corps of Engineers. The USFWS has promulgated specific policies for preserving, protecting and enhancing the fish and wildlife resources of the San Francisco Bay.

California Department of Fish and Game. The State Department of Fish and Game, a division of the State Resources Agency, is charged with protecting and conserving the State's fish and wildlife resources, including the supporting habitats and ecosystems. The department implements the State Resource Agency Policy for Preservation of Wetlands in perpetuity, as well as its own policy Guidelines for Protection and Restoration of San Francisco Bay Fish and Wildlife Habitat.

Although the department does not issue permits for development projects, its advice is part of the permit application and decision making processes of the U.S. Army Corps of Engineers when the Corps of Engineers is the final permitting agency. Its contributory role in the Corps of Engineers permit processes is established by the U.S. Fish and Wildlife Coordination Act, the State wetlands policy, and Corps of Engineers regulations.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

There are two basic effects that the proposed control measures of the CAP may have upon the biological resources in the District: improvement of the air quality of the Bay Area, in particular the CO and ozone levels, and potential indirect effects upon the resources as a result of changes in land uses in support of the proposed control measures.

Effects of Carbon Monoxide and Ozone on Plants

The effect of air pollution on plants depends upon the susceptibility of the plant species and the type of air pollutant involved. In many cases, the effects are manifested in reduced growth rates or yields rather than in mortalities. The more common documented effects of air pollution on plants include flower and foliage discoloration, bloom failure, plant malformation, early leaf and fruit drop, and a decrease in the values of crops.

Very little is known about the effects of high concentrations of CO on plant tissues; however, the effects of ozone on vegetation are well-documented. The effects of ozone on vegetation tissues were first noted in the late 1950s.[2] At sufficiently high concentrations, ozone produces tissue collapse and markings (stippling - red-brown pigment, and flecking - bleached straw to white) on the upper surface of the leaf.[3] Although physical evidence of ozone damage to leaves is typically

used to diagnose this impact, the greatest effect of ozone toxicity is a reduction in growth and yield that may occur long before the physical symptoms appear.

Crop plants that are especially sensitive to ozone damage include grapes, lettuce, alfalfa, barley, oats, wheat, spinach, pinto beans, tomatoes, cut flowers, and potatoes. Native trees that have shown evidence of sensitivity to ozone levels elsewhere include ash, aspen, and pines. Conifer trees (especially pines) tend to be among the plant groups more sensitive to air pollutants. Lichens (symbiotic associations of fungi and algae) are among the most sensitive of all organisms to air pollutants.[4] Exposures at concentrations of 0.1 ppm or less for one to eight hours may result in damage to the leaf tissues of these plants.[5]

The ponderosa pine forests of the San Bernardino Mountains in Southern California serve as the best example of the effects of air quality on a native plant community in California.[6] The Ponderosa pine (*Pinus ponderosa*) is apparently more susceptible to air quality damage than some of the other tree species in the region. As the populations of ponderosa pines and Jeffery pines (*P. jefferyi*) declined, the more tolerant conifer species (*P. coulteri*, *P. lambertiana* and *Libocedrus decurrens*) became more prevalent in those habitats that were suitable. In some cases, the habitats once populated by the ponderosa pines were not suitable for the other tree species and the forest habitat has been replaced with a more open woodland habitat. These types of vegetation changes affected the wildlife use of these areas as well.

Effects of Carbon Monoxide and Ozone on Wildlife

Studies and case histories of the effects of air pollution on wildlife have focused upon domestic animals that feed on fodder (cows, horses, sheep, etc.). These effects tend to be localized, resulting in high concentrations of fluorides in the fodder ingested by the animals, which in turn produce high concentrations of fluoride in the tissues, causing bone diseases and even death.[7]

With the exception of the impacts associated with chronic poisonings of heavy metals and fluoride derived from air quality sources, there has been very little, if any, research on the ways in which air quality impacts wildlife. It is doubtful that there are any acute effects of air quality constituents upon the native wildlife or livestock in the region. It is very possible, however, that degraded air quality conditions may have an accumulative adverse effect upon wildlife species just as it does with

humans. For the purposes of this analysis, the greatest potential effect to the wildlife in the region would be changes in the vegetation communities upon which a given species may depend.

Effects of Carbon Monoxide and Ozone on Sensitive Species

None of the sensitive plant and animal species noted above are believed to be directly affected by the air quality conditions in the region. Although any improvement in the air quality conditions in the region is expected to improve the ecological conditions for all species of plant and animals, these beneficial effects are not expected to be significant in terms of preserving sensitive plant or animal species.

Changes in Land Use Effects on Plant and Wildlife Resources

Although the proposed control measures of the CAP are not expected to result in any direct effects upon plant and wildlife habitats, the implementation of some of the control measures may result in changes in land uses resulting in the removal of native vegetation and wildlife habitats. For example, the location of a new transit center may result in the loss of wetlands. Each new facility would have to be evaluated prior to construction to determine whether development of the selected location would adversely effect some sensitive biotic resource(s).

Standards of Significance

For the purpose of this EIR, potential effects on the following resources were considered significant:

- locations and/or principal concentrations of rare and/or endangered species, commercial species, or game species;
- areas of seasonal concentrations of wildlife species;
- riparian habitats;
- wetlands habitats;
- locations of sensitive plant and animal species;
- spawning and nursery stream habitats; and
- areas of scientific or educational use.

Overview of Impacts of the CAP on Biological Resources

Impact

4.8-1 **The CAP would result in the overall improvement of the air quality in the San Francisco Bay Area, and improved air quality would be beneficial to biotic resources in the region.**

As discussed above, improved air quality would reduce damage to fauna and flora, including crops.

Mitigation Measure

4.8-1 *None recommended or required.*

Mobile Source Control Measures

Impacts from Employer-Based Trip Reduction Measures

Impact

4.8-2 **TCMs 1 and 2 are expected to result in the overall improvement of the air quality in the San Francisco Bay Area and thus result in beneficial effects to the biotic resources in the region.**

Mitigation Measure

4.8-2 *None recommended or required.*

Impacts from Mobility Improvements

Impact

4.8-3 **Transportation Control Measures 3, 4, 5, 7, 8 and 9 would all involve the construction of structures and/or facilities in support of these measures, such as transit stations, HOV lanes, and bicycle facilities. If these new structures and/or facilities are located in sensitive habitats, they may result in significant impacts to sensitive plant and/or animal species.**

The development of facilities near or in close proximity to sensitive habitats, such as wetlands, riparian zones, and populations of sensitive plant and/or animal species, could adversely effect these sensitive resources and result in significant impacts. Significant adverse impacts to plant and

wildlife species and habitats currently occurring in the District will most likely continue as the human population of the region continues to grow.

Mitigation Measure

4.8-3 *All jurisdictions with facility siting authority should conserve sensitive environments by preserving these areas whenever possible or compensating for the loss of the resource where feasible and avoidance is not possible. Preservation of those lands should be accomplished through regulatory controls, incentive measures, and direct local jurisdiction expenditures. Local and State jurisdictions with siting review authority are responsible for implementing proper siting controls to ensure the protection of sensitive habitats, and species of plants and wildlife. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impacts from Traffic Operation Management Control Measures

These measures would indirectly benefit biologic resources through improved air quality.

Impacts from User Incentives

These measures would indirectly benefit biologic resources through improved air quality.

Impacts from Indirect Source Review Measures

Impact

4.8-4 **Possible changes in land use that may result from indirect source rules could result in significant impacts to sensitive habitats and species.**

Mitigation Measure

4.8-4 *See Mitigation Measure 4.8-3.*

Impacts from Implementation Support Measures

Impact

4.8-5 **Transportation Control Measure 18 may result in the same impacts as indicated in Impact 4.8-3.**

Mitigation Measure

4.8-5 *See Mitigation Measure 4.8-3.*

Impacts Related to Ozone Excess "No Drive Days"

These measures would indirectly benefit biologic resources through improved air quality.

Impacts Related to Motor Vehicle Control Measures

Impact

4.8-6 **Contingency Measure H4, if implemented, could result in the need to increase the production of electrical energy to support the measure. If added electrical energy sources are required, more hydroelectric facilities or other types of electrical generating facilities may need to be developed. If these new structures and/or facilities are located in sensitive habitats, they may result in significant impacts to sensitive plant and/or animal species.**

Mitigation Measure

4.8-6 *See Mitigation Measure 4.8-3.*

Impacts from Market-Based Transportation Control Measures

These measures would indirectly benefit biologic resources through improved air quality.

Stationary Source Control Measures

These measures would indirectly benefit biologic resources through improved air quality.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

Continuing population growth and development in the Bay Area will put pressure on developing new land. Construction on previously undeveloped land may affect sensitive habitats and species. To the extent that certain CAP measures, including construction of new transportation facilities and

redirection of new development, may also affect sensitive habitats and species, there may be cumulative impacts.

Suitable mitigation for possible cumulative impacts to threatened biological resources includes preservation and site-specific mitigation measures. Mitigation Measure 4.8-2 discusses these measures in detail.

Stationary Source Control Measures

Stationary source control measures would not result in cumulative adverse impacts to sensitive habitats or species.

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1. State of California, A Guide to Wildlife Habitats of California, October 1988. Kenneth E. Mayer and William F. Laudenslayer Jr., Editors.

2. Kenneth Wark and Cecil F. Warner, Air Pollution Its Origin and Control, Second Edition, 1981.

3. P. Aarne Vesilind and J. Jeffrey Peirce, Environmental Pollution and Control, Second Edition, 1983.

4. S. Calvert and Harold M. Englund (editors), Handbook of Air Pollution Technology, 1984.

5. M. Treshow, Environment and Plant Response, 1970.

6. S. Calvert and Harold M. Englund, op cit.

7. Vesilind and Peirce, op cit.

4.9 GEOLOGY AND SEISMICITY

This section describes the geologic and seismic setting for the CAP and evaluates the project's potential to cause geologic impacts such as erosion, or to subject people or property to geologic hazards such as earthquakes and landslides. As background for the impacts analysis, this section also includes a discussion of the methods by which various public agencies regulate development and reduce potential geologic impacts.

SETTING[1]

The San Francisco Bay Area is bounded on the west by the Pacific Ocean and Santa Cruz County, on the north by central Sonoma and Solano Counties, on the east by the San Joaquin Valley (including portions of Sacramento, San Joaquin, Stanislaus and Merced counties), and on the south by San Benito County. This area is completely contained in the natural (geomorphic) province called the California Coast Ranges which extends north to the Klamath Mountains and south to the Transverse Ranges and lies between the Pacific Ocean and the (Great) Central Valley.

The topography of the area is varied, with the predominant physiographic feature being the nearly-enclosed basin occupied by the San Francisco Bay. The San Francisco Bay basin is surrounded by hills and ridges that are locally rugged. Prominent hillside areas include the Santa Cruz Mountains, the East Bay Hills, the Diablo Range, and extensive upland areas north and northwest of the San Francisco Bay. The highest peaks in the area are Mount Hamilton in the southern Diablo Range of eastern Santa Clara County at an elevation of 4,209 feet, and Mount Diablo in east Contra Costa County at an elevation of 3,849 feet. Numerous other hills and ridges in the vicinity exceed 2,000 feet in elevation.

Prominent valleys in the study area include the Petaluma-Santa Rosa, Sonoma, and Napa Valleys north of San Francisco Bay, the Livermore and San Ramon Valleys east of San Francisco Bay, and the Santa Clara Valley south of the Bay. The easternmost part of the BAAQMD jurisdiction extends into the Central Valley.

Regional Geology

A distinction of the California Coast Range province is the presence of two entirely different core rock complexes, one being a Jurassic-Cretaceous (approximately 208 to 66 million years old)

assemblage called the Franciscan rocks, and the other consisting of Cretaceous granitic intrusive and older metamorphic rocks. The two unrelated, incompatible core complexes lie side by side, separated from each other by faults of impressive magnitude. A thick blanket of late Cretaceous and Cenozoic (about 97.5 million years old to present day) clastic sedimentary rocks covers large parts of the province, tending to conceal the inner schisms. Intermittent but persistent crustal movement has shaped the sediments and unconformities. Folds, thrust faults, steep reverse faults, and strike-slip faults developed as a consequence of Cenozoic deformation, some of which is continuing today.[2]

The youngest geologic units in the area are the thick unconsolidated alluvial deposits that underlie the valleys in the region and the estuarine sediments that underlie San Francisco Bay and the Delta. Alluvial deposits consist of gravel, sand, silt and clay that may be many hundreds of feet thick in some areas. Estuarine deposits include soft, saturated bay mud and peat that underlie shoreline and former marsh areas. Considerable portions of the urbanized areas within the region have been built on fill that was placed over the soft bay mud deposits.

Faulting and Seismic Activity

The jurisdiction of the BAAQMD is located in a seismically-active area and is subject to frequent earthquake activity. Major faults within the area include the San Andreas fault, the Hayward fault, the Calaveras fault and the Rodgers Creek fault, as shown in Figure 4.9-1. The following is a summary of these active faults in the area, including historic earthquake activity and potential for generating future earthquakes. (For further descriptions of these and other regional faults, the reader is referred to the setting section of Chapter 7, Geology and Seismicity, of the Draft EIR for MTC's Regional Transportation Plan, April 1991, which is incorporated by reference.)

<u>San Andreas Fault</u>. This fault, the most prominent in the state, is over 170 miles in length. Its trend is through the Santa Cruz Mountains in the southern part of the Bay region and along the coastal margin in the northern part. The fault trace passes through western Santa Clara County, San Mateo County, a few miles offshore of San Francisco County, western Marin County, and western Sonoma County. The largest historic earthquake along the San Andreas was the 1906 San Francisco earthquake with a magnitude of 8.3 on the Richter scale (M8.3) The maximum credible earthquake (MCE) which could be generated by this fault is M7.8.[3]

Hayward Fault. This fault has a northwest trend along the base of the East Bay Hills for a distance of 45 miles. The fault trace passes through a small portion of northern Santa Clara County, western Alameda County, and the northwestern portion of Contra Costa County. The two largest historic earthquakes along the Hayward fault took place in 1836 and 1868. The estimated magnitude of both earthquakes was approximately M7.0. The Hayward fault is capable of generating an M7.1 MCE.[4]

Calaveras Fault. The Calaveras fault splits from the San Andreas fault just south of Hollister and has a northwest trend along the eastern boundary of the Santa Clara Valley and into the Diablo Range. The fault trace passes through Santa Clara County, Alameda County, and into the southern portion of Contra Costa County. The total length of the fault is about 71 miles. The largest historic earthquake along the Calaveras was in 1861 with a magnitude of M6.0. The Calaveras fault is estimated to be capable of generating an M6.3 MCE.[5]

Rodgers Creek Fault. This fault has a northwest trend from San Pablo Bay up through Santa Rosa and into Healdsburg. The fault runs for 45 miles and is contained entirely within Sonoma County. The largest recorded earthquake was an M5.7. The Rodgers Creek fault is estimated to be capable of generating an M6.9 MCE.[6]

The peak ground acceleration from MCE in the region is expected to range mostly between a minimum of approximately 30 percent of the force of gravity (0.3 g) and a maximum of about 0.6 g, although ground accelerations greater than 0.6 g are likely.[7,8] The area covered by the BAAQMD jurisdiction lies almost entirely within Seismic Zone 4, a zone considered for structural design purposes to be subject to ground shaking severity roughly corresponding to 0.4 g.[9]

An M7 or larger earthquake along any of the San Andreas, Hayward or Rodgers Creek fault segments would have a major impact on the entire San Francisco Bay region. The chance of one or more large earthquakes in the San Francisco Bay region before the year 2020 is estimated to be about 67 percent.[10] The minimum information required for earthquake probability analysis of the region is available only for the faults cited above; other potentially important faults in the region will require more study before they can be evaluated. Hence, this calculated probability is necessarily a minimum estimate of the hazard.

Subsidence and Liquefaction

Subsidence, or the downward displacement of soils, occurs mainly in marsh or bog areas and in areas with extensive removal of underground oil or water. Within the BAAQMD jurisdiction, subsidence has historically been encountered in the peat and other organic soils in the Sacramento-San Joaquin Delta. Before levees were built around the islands in the Delta to reclaim the land for agriculture, the elevation of the area was at about sea level. Today much of the central land area, commonly known as the Delta lowlands, has subsided to below sea level.[11]

Soil liquefaction is defined as the transformation of a granular material from a solid into a liquefied state as a consequence of increased pore-water pressures. This phenomenon commonly occurs when high-water-table or marsh areas with fine-grained, low-density deposits are subjected to earthquake ground shaking. Liquefaction has a critical effect on the safe performance of engineered construction and the stability of certain geologic formations, and may pose a hazard when it leads to some form of permanent ground movement or ground failure.[12]

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

In accordance with the Environmental Checklist Form (Appendix I) of the CEQA Guidelines (1986), this section evaluates the CAP in terms of its potential to result in: a) disruptions, displacements, compaction or overcovering of the soil; b) change in topography or ground surface relief features; c) any increase in wind or water erosion of soils; and d) exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure or similar hazards.

In general, the CAP is not expected to result in any of the following geologic impacts listed in the Environmental Checklist Form: a) unstable earth conditions or changes in geologic substructures; b) destruction, covering or modification of any unique geologic or physical features; or c) changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion that may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake. However, future plans or projects related to implementation of the CAP would be subject to

project-specific environmental review, including evaluation of the project's potential to cause the effects listed above.

Standards of Significance

As described in the Significant Effects list (Appendix G) of the CEQA Guidelines, the project would normally have a significant geologic effect on the environment if it will cause substantial erosion or siltation or expose people or structures to major geologic hazards. Where necessary, mitigation measures are suggested to reduce potential impacts.

Impact Background

Although construction and land use changes associated with implementation of the CAP could create adverse geologic impacts, other factors are expected to exert a greater influence in this area. Anticipated population increases in the region will result in continued development and corresponding potential for disruptions, displacement, compaction and overcovering of soils, resulting in changes to topographical and ground surface relief features. Development will also occur in areas with degrees of geologic hazard (e.g., steep slopes, areas of active faulting). Like geologic impacts of the CAP, such impacts are currently (and will continue to be) analyzed and mitigated primarily through government review and permitting processes.

Numerous controls may be imposed on new development through permitting processes. In general, public agencies regulate development (and reduce potential geologic impacts) under the requirements of the California Building Code, the Alquist-Priolo Special Studies Zone Act, local land use policies and zoning, and project-specific mitigation measures. In addition, municipalities may require grading plans and erosion control measures to be developed and implemented for projects under certain circumstances. The following summarizes how the regulations listed above serve to reduce the geologic impacts of projects.

<u>California Building Code (CBC)</u>

The CBC is contained in Title 24 of the California Code of Regulations, and adopts the Uniform Building Code (UBC) by reference. Title 24 is the building and related codes of the State of California affecting California public buildings and a large percentage of privately owned structures. Building standard regulations governing the process of plan review, permit issuance, construction

inspection, license issuance, fees for these activities and other related requirements are regulations "that implement or enforce" building standards. Local codes adopted by cities and counties may be more restrictive than Title 24, but may not be less restrictive.[13]

The CBC contains provisions which regulate the design and construction of excavations, foundations, retaining walls and other building elements to control the effects of seismic ground shaking and adverse soil conditions. For projects in the region covered by the CAP, Seismic Zone 4 requirements apply.

Alquist-Priolo Special Studies Zone Act

The Alquist-Priolo Act of 1972 regulates development near active faults so as to mitigate the hazard of surface fault-rupture. Under the act, the State Geologist is required to delineate "special studies zones" along known active faults in California. The act also requires that, prior to approval of a project, a geologic study be conducted to define and delineate any hazards from surface rupture. A geologist registered in the State of California, within or retained by the lead agency for the project, must evaluate this geologic report. A 50-foot setback from any trace of an active fault is required.

Local Land Use Policies and Zoning

As previously stated, cities and counties may adopt more restrictive development guidelines than are required under the CBC. Such guidelines may limit land uses or otherwise affect construction in severe slopes areas, or areas subject to liquefaction, flooding, or other geologic hazard. In such areas, development may be excluded, or may be controlled by special design and/or construction methods.

Project-Specific Mitigation Measures

During the environmental review process, the lead agency for a project may identify measures to be incorporated into the project to reduce its geologic impacts. Typically, such mitigation measures might include incorporating the recommendations of a project-specific geologic report to reduce seismic hazards to people and property or using Best Management Practices to avoid erosion effects.

Because the requirements discussed above would apply to projects associated with the CAP, they would avoid or reduce potential geologic impacts which could otherwise accompany such projects. The following description of the geologic impacts of the CAP assumes compliance with the requirements identified above.

Mobile Source Control Measures

Impacts Related to Motor Vehicle Control Measures, Mobility Improvements and Implementation Support Measures

Impact

4.9-1 **Implementation of the following control measures -- TCM 3, 4, 5, 7, 8, 9, and 18 -- would involve grading, excavation or other earthmoving activities which could cause disruptions, displacements, compaction or overcovering of soils; changes in ground surface relief features; and erosion. If Contingency Measure H4 is implemented, it would also contribute to this impact.**

The control measures cited in the impact involve rail extensions and other transportation facilities such as HOV lanes, bike paths, parking lots, etc. Further, TCM 18 would result in higher density, cluster development along mass transit lines, some of which could involve new construction of buildings and related infrastructure. New developments among those listed above would be subject to project-specific environmental review including analysis of potential geologic impacts. It is the responsibility of local governments to mitigate impacts resulting from construction activities through their discretionary permit authority over site-specific land uses. Conditions should be placed on specific projects to control erosion and ensure grading is conducted in conformity with accepted practices. Developers should also be required to mitigate the impacts of development by implementing grading plans sensitive to the local landscape.

Mitigation Measures

4.9-1(a) *Construction projects associated with CAP control measures should both minimize grading and excavation, and balance import and export of earth materials to the extent feasible given project design.*

4.9-1(b) *Grading and excavation for projects associated with the CAP should be performed so as to cause minimal erosion. Where necessary, projects should include grading and erosion control plans. Techniques to minimize erosion should include, but not be limited to, avoiding winter earth moving activities where feasible, leaving rough graded surfaces to facilitate re-vegetation, using coverings and mulches on disturbed areas, and replanting as soon as possible after construction.*

Impact 4.9-2 **Implementation of the TCMs cited in Impact 4.9-1 may cause development in areas of geotechnical hazards such as earthquake faults, subsidence or liquefaction areas, or landslides. Such development could expose people and property to geologic hazards.**

As stated in Impact 4.9-1 above, the control measures cited in this impact involve rail extensions and other transportation facilities such as HOV lanes, bike paths, parking lots, etc., as well as higher density, cluster development along mass transit lines and potential increased distribution systems for electricity or alternative fuels. Such developments would be subject to project-specific environmental review including analysis of potential geologic impacts. It is the responsibility of local governments to mitigate impacts resulting from placing development in areas of geologic hazard through their discretionary permit authority over site-specific land uses. Conditions should be placed on specific projects to avoid development in areas where standard engineering practices would not be expected to overcome potential geologic hazards to people or property. Developers should also be required to mitigate the impacts of development by meeting design requirements to minimize the effects of geotechnical hazards that may be encountered at specific sites.

Mitigation Measures

4.9-2 *Where specific development projects associated with CAP control measures are located in areas of potential geologic hazard, project-specific geologic reports should be required to evaluate the hazards and to propose design and/or construction methods to reduce the effects of the geologic condition(s) on the project. Geotechnical reports would be prepared by a geologist registered in the State of California.*

Projects associated with the CAP that comply with applicable regulations and, where necessary, incorporate the recommendations of project-specific geologic reports, would not be expected to create significant geologic impacts related to exposing people or property to geologic hazards.

Stationary Source Control Measures

In general, stationary source control measures proposed in the CAP would not involve construction in previously undeveloped areas or alterations of existing land uses. Assuming that projects associated with CAP stationary source control measures, such as installation of abatement devices, are performed in compliance with applicable regulatioins, such measures are not expected to create impacts related to geology and seismicity.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

It is expected that geologic impacts resulting from implementation of the CAP either are less than significant or can be mitigated to a less than significant level, particularly when compared to those geologic impacts associated with human population growth in the region and the accompanying change in land use (i.e., developing or increasing the level of development of existing sites). When population growth and its attendant infrastructure development are considered, CAP control measures would have little or no direct effects on the geology and topography in the Bay Area.

Significant cumulative geologic impacts are likely to occur in the region during the project "lifetime." Such impacts are anticipated as residential, commercial, industrial and infrastructure developments are constructed to accommodate increasing population. These impacts, however, are within the jurisdiction of other agencies and are not within the jurisdiction of the BAAQMD. These other agencies are responsible for identifying direct, indirect and long-term cumulative impacts of other projects and plans as part of their on-going environmental review processes. The contribution of the proposed project to cumulative geologic impacts would be mitigated by the measures identified in the discussion above.

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1. A portion of this setting discussion has been adopted from Chapter 7 of the <u>Draft Environmental Impact Report for the Metropolitan Transportation Commission's Regional Transportation Plan</u>, April 1991.

2. Ben M. Page, "Geology of the Coast Ranges in California," in <u>Geology of Northern California</u>, California Division of Mines and Geology, 1966, pp. 255-276.

3. Steven G. Wesnousky, "Earthquakes, Quaternary Faults, and Seismic Hazard in California," pp. 12,587-12,631 in Journal of Geophysical Research, Vol. 91, No. B12, November 10, 1986.

4. Ibid.

5. Ibid.

6. Ibid.

7. California Division of Mines and Geology, Maximum Credible Acceleration from Earthquakes in California, 1974. (Revised 1987 as a tentative source of seismic data designated for planning purposes only.)

8. William B. Joyner and David M. Boore, "Measurement, Characterization, and Prediction of Strong Ground Motion," pp. 43-102 in Proceedings of Earthquake Engineering and Soil Dynamics II--Recent Advances in Ground-Motion Evaluation, GT Div/ASCE, Park City, Utah, June 27-30, 1988, Geotechnical Special Publication No. 20.

9. Seismology Committee, Structural Engineers Association of California, Recommended Lateral Force Requirements and Tentative Commentary, 1988.

10. Working Group on California Earthquake Probabilities, Probabilities of Large Earthquakes in the San Francisco Bay Region, California, U.S. Geological Survey Circular 1053, approved for publication July 19, 1990, p. 1.

11. George Newmarch, "Subsidence of Organic Soils, Sacramento-San Joaquin Delta," in California Geology, July 1981, Vol. 34, No. 7., pp. 135-141.

12. T. Leslie Youd, Liquefaction, Flow and Associated Ground Failure, U.S. Geological Survey Circular 688, 1973.

13. International Conference of Building Officials, Uniform Building Code, 1989.

4.10 HYDROLOGY AND WATER QUALITY

This section of the EIR identifies and evaluates potential hydrological and water quality impacts that could result from the implementation of the proposed Clean Air Plan. The analysis evaluates the proposed plan in relation to surface and groundwater resources, the potential for flooding and the potential effect of plan implementation on water quality, erosion and sedimentation.

SETTING

Surface Water Hydrology

The San Francisco Bay Basin includes all or major portions of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties. The basin boundaries are similar to the boundaries of the BAAQMD. The Bay Basin is bounded by the Santa Cruz Mountains to the west, the Diablo Range to the east, and the Bayside foothills to the north and northeast. About 40 percent of the land in California drains into the San Francisco Bay and the Bay functions as the only drainage outlet for waters of the Central Valley. The San Francisco Bay system is the most extensive and significant estuary on the California coast.

San Francisco Bay has been greatly altered from its natural condition by human activities.[1] Between 1853 and 1884, hydraulic mining of gold in the Sierra Nevada washed tens of millions of tons of sand and mud into San Francisco Bay, reducing the extent of open water and creating new mud banks. Later, much of the tidal marsh surrounding the Bay was filled for urban and agricultural use. In this century, as industry expanded and urban sewerage systems were built, increasing quantities of wastewater were discharged to the Bay. Freshwater inflow to the Bay diminished, as large quantities of water were diverted, and exported to the San Joaquin Valley and Southern California for urban and agricultural use. Despite these changes, the Bay remains a prized natural resource.

The Sacramento and San Joaquin Rivers contribute almost all of the fresh water inflow to the Bay. These major rivers are at the eastern boundary of the San Francisco Bay Basin and enter the Bay system through the Delta at the eastern end of Suisun Bay. There are many small streams and rivers within the basin, including Petaluma River, Sonoma Creek, Napa River, Suisun Marsh, and Alameda Creek. Other major receiving water segments, in addition to the Pacific Ocean and the Bay include Suisun Bay, San Pablo Bay, Richardson Bay and Tomales Bay.[2]

Rainfall ranges in the Bay Area from an average of 12 inches a year in San Jose to over 60 inches in parts of the Santa Cruz Mountains. Streamflow in the Bay Area is highly seasonal with 90 percent of the annual runoff occurring between November and April. Many streams go dry during the summer months.[3]

The quality of the San Francisco Bay and other major receiving waters in the Bay Area varies seasonally. For most of the year, the quality of these waters is similar to that of the water of the Pacific Ocean. From December through April, water quality is affected by freshwater inflow from the Sacramento-San Joaquin delta and from other, smaller, tributaries. The rivers that feed the Bay are its major source of metal pollutants. City streets are a major source of hydrocarbons in the Bay.

Water Supply

The San Francisco Bay Area has 18 major reservoirs with a total capacity of 697,000 acre-feet of water. Historically, the average amount of water in these reservoirs is 403,900 acre-feet.[4] All private and public suppliers of municipal and domestic water supply are required to meet the water quality standards set forth in the California Code of Regulations.

Groundwater

There are several major groundwater basins in the Bay Area. The Regional Water Quality Control Board (RWQCB) maintains a groundwater monitoring network of wells in the Bay Area. The network is used to record existing conditions, establish baseline conditions, evaluate trends in quality, detect pollution and water quality degradation at an early stage, and evaluate the effect of point and non-point source pollution on groundwater quality.[5]

Areas susceptible to groundwater contamination include areas where wells or permeable soils serve as pathways for contaminants; areas of rapid percolation; areas susceptible to flooding; surface water infiltration areas; and areas where there are no impermeable layers of clay or other material to shield the natural aquifers. Sources of groundwater contamination include wastewater treatment facilities; septic tank leachfields; agriculture or landscaping activities that use pesticides or fertilizers; spills or leaks of hazardous materials and waste; leachate from improperly located or mismanaged

solid waste disposal sites; and illegally dumped materials and wastes. Abandoned and unused wells can act as conduits to transfer contaminated water from an upper to a lower aquifer.

Drainage and Flooding

All public drainage facilities are under the jurisdiction of the local government with the exception of facilities that are part of a flood control district. The design capacity of storm drainage systems depends on the size of the watershed areas being served and the peak runoff quantity (design capacity). Design capacity is dependent on several factors: the amount of rainfall, the storm duration, the efficiency of the upstream drainage systems, the characteristics of the watershed, and the amount of impervious surfaces in the watershed. Impervious surfaces such as pavement and buildings generate more runoff than earth surfaces. Impervious surfaces also change the timing of flood flows through flood control channels. The increased runoff and peak flood flow timing changes represent important factors affecting the storm-carrying capacity of natural creeks or flood control channels.

Areas designated by the U.S. Federal Emergency Management Agency (FEMA) as lying within the 100-year flood plain are usually considered inappropriate for conventional urban development due to flood hazards as defined by FEMA. Often times development within the 100-year flood plain is managed by a flood management plan developed in the local general plan.

Acid Deposition

Acid deposition can occur in the form of acid rain, acid fog, and dry deposition. Nitric acid is a major contributor to the acidity of suspended particles and of cloud, rain and fog moisture. Nitric acid is formed most commonly by the reaction of NO_2 with hydroxyl (OH^-) radicals during daylight hours. Sulfur dioxide (SO_2), which oxidizes in the atmosphere to create sulfuric acid, is also an important acid precursor but is emitted in much less quantity in California than NO_x. Acid deposition does occur in many locations in California, particularly in locations already known to experience air pollution problems.[6]

Acid rain has a pH of 2 or less and is responsible for acidifying streams and lakes. Because of the relatively low quantity of rain in California, dry deposition of acids may be more of a problem

than acid rain. The Bay Area does not experience major problems with acid deposition compared to other California areas, such as the South Coast.

Relevant Plans and Policies

Agencies charged with regulatory responsibilities for water quality and flood control for the Bay area are listed below.

- o The California State Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, is designated by the State of California to protect the water resources of the San Francisco Bay Area.
- o The United States Army Corps of Engineers (COE) is a federal agency with permit authority for filling of waterways or wetlands.
- o The California Department of Fish and Game (CDFG) is a State agency with permit authority for modification of waterways.
- o Regional and local water districts, public and private, provide potable water service for the San Francisco Bay area. They are responsible for managing the waters that provide the drinking supply, and the treatment of water for urban uses.
- o The City and County Public Works Department are responsible for flood control and storm drainage systems within the individual Cities and Counties.

Other agencies with some interest in water/water quality are the U. S. Fish and Wildlife Service, the U. S. Environmental Protection Agency, the California Department of Health Services and the California Department of Water Resources, Division of Safety of Dams.

California State policy for water quality is designed to achieve the highest water quality consistent with maximum benefit to the people. An effort is made to protect all water resources from excessive waste discharges. Beneficial uses of surface water, groundwater, marshes, and mud flats serve as the basis for water quality standards and discharge prohibitions to attain water quality goals. Beneficial uses include: municipal, domestic, agricultural supply, and industrial service supply; ground water recharge; fresh water replenishment; navigation; water contact and non-contact recreation; ocean commercial and sport fishing; warm and cold fresh water habitat; preservation of areas of special biological significance; wildlife, marine and estuarine habitat; preservation of rare and endangered species; fish migration; fish spawning; and shellfish harvesting.[7]

The RWQCB was required by law to develop, adopt, and implement a Water Quality Control Plan (WQCP) for the entire region. The original WQCP, San Francisco Bay Basin (Basin Plan) was implemented in 1975. The most recent WQCP was adopted by the RWQCB and approved by the State Board in 1986. The principal elements of the plan are: statement of beneficial water uses which the Board will protect; water quality objectives needed to protect the designated beneficial water uses; and strategies and time schedules for achieving the water quality objectives.

By October 1992, both industrial and municipal discharges of stormwater runoff will be regulated by EPA through National Pollution Discharge Elimination System (NPDES) permit application regulations. Industrial discharges of stormwater runoff includes the discharge from any stormwater collection system which is directly related to industrial activity, including handling of toxic and hazardous substances. Nonregulated areas include office buildings and accompanying parking lots which are separate from the plant's industrial activities. Requirements for municipal separate stormwater system permit include prohibition of non-stormwater discharges into storm sewers and other controls to reduce the discharge of pollutants to the maximum extent practicable. Industrial wastewater discharge is currently regulated by EPA through NPDES.

Hazardous Waste Management Plans (HWMPs) have been developed by local jurisdictions in response to growing concern for the need to plan for the effective management of hazardous waste. Policies and programs implemented as part of HWMPs will promote waste reduction, ensure that state-of-the-art technology is being used, reduce unsafe and illegal hazardous waste management practices, and improve water quality.

Bay Area cities and counties have water quality standards in place that are considered during the local development review process and would prevent new additions to the drainage system that do not meet established standards. Control measures to prevent erosion and sedimentation and degradation of water quality are imposed by local building agencies for private and public construction projects. An example of such a measure is a prohibition on construction on dry, windy days in areas noted for high erosion potential.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

Some of the mobile source control measures would encourage new and improved transit lines, as well as altered patterns in land use. Impacts may occur during construction associated with these measures due to increased erosion or sedimentation or hazardous spills. New construction and improvements may also increase the total impervious surface area of local areas, subsequently increasing surface runoff and stormwater drainage capacity requirements and creating a significant impact. In general, most transit construction and improvements would occur in regions that are currently highly urbanized and would not experience a substantial increase in impervious surface area or drainage requirements.

Many stationary source control measures would encourage or require the use of additional pollution control devices that use hazardous materials and generate liquid and solid hazardous waste. This may cause significant impacts due to greater possibility for surface and groundwater degradation through spills, leaching, and improper handling and disposal. In addition, wastewater from control equipment could become contaminated and, if discharged into sewers or water ways, could affect water quality.

Many stationary source control measures would reduce the amount of hazardous substances used, generated, and disposed. This may lead to fewer spills, accidents, and hazardous waste disposed in landfills. However, many stationary source control measures would also increase the amount of solid hazardous waste generated. This may lead to greater possibility of surface and groundwater degradation through storm drains, spills, and leaching, as a result of these additional pollution control devices.

Standards for Significance

According to the California Environmental Quality Act (CEQA) a proposed project would have a significant adverse impact if the project would result in substantial degradation of surface or groundwater resources compared to prevailing standards, or whether it would cause or increase the potential for substantial flooding, erosion, or siltation. Mobile source control measure impacts are analyzed in terms of whether or not implementation and construction associated with the proposed measures would create a fundamental change in any of the water resources in the Bay

Area. Examples of this type of impact include the increase of sedimentation or erosion rates caused by the exposure of soil during grading, excavation, or construction activities, and hydrologic changes that could alter water quality and flooding potential within the project area.

The basic criterion applied to the analysis of stationary control measure impacts is whether or not implementation of the proposed measures would create a reduction in the quality of surface water runoff and groundwater. Examples of this type of impact includes an increase in hazardous waste generation or the increase in contaminants in industrial wastewater.

Local governments would monitor site specific mitigation measures through project review, plan checking and reporting procedures that would include on-site inspections. Many mitigation measures and "monitoring" programs already exist in the form of proposed natural resources policies, required site preparation and construction standards, ordinance requirements, and permit approvals from local, State or federal agencies.

Mobile Source Control Measures

Overview of Mobile Source Control Measures

Most mobile source control measures would have a beneficial water quality effect by reducing VMT in the Bay Area and decreasing automobile-related pollutants entering the San Francisco Bay. Some of the TCMs that would involve construction may have significant impacts to water quality due to construction-related sediment and chemicals. Flood hazard impacts may be created by redirected drainage patterns or substantial increases in impervious surface areas.

Impacts from Employer-Based Trip Reduction Measures

Impact

4.10-1 **Implementation of TCM 1 and TCM 2 would reduce commuter vehicle trips. This would be a beneficial water quality effect.**

Many of the mobile source control measures would reduce total vehicle trips in the Bay Area and encourage use of alternative modes of transit. The reduction in vehicle trips would result in a decrease in automobile-related chemicals and debris introduced to the surface water and groundwater of the Bay Area. Pollutants of concern include gas, oil, rubber, grease, lead, and

other auto-related substances. While operation of each related control measure would not necessarily result in a substantial decrease on the rate of degradation of water quality, implementation of all of the CAP mobile source control measures may have a substantial beneficial effect on the surface water and groundwater of the Bay Area.

Mitigation Measure

4.10-1 *None recommended or required.*

Impacts from Mobility Improvements

Each of these control measures is expected to increase mobility through reduction in vehicle trips and would have beneficial water quality effects. TCMs that involve construction of transit lines or improvements may have adverse water quality impacts.

Impact

4.10-2 **Implementation of TCMs 3, 4, 5, 7, 8, and 9 could result in degradation of surface water and groundwater quality through construction-related sediment and chemicals. This would be a potentially significant impact.**

Transportation-related construction would result in excavation and grading operations that would increase erosion and sedimentation potential. In addition, construction activities involve the use of fuel and other hazardous substances that could be spilled. Both of these actions would result in the subsequent degradation of surface water and groundwater quality. While construction of each individual transit facility or parking lot would not necessarily result in a significant water quality impact, construction associated with the entire set of mobility improvements would add to the cumulative contaminant load carried into the aquatic environment and may result in significant impact to Bay Area surface water and groundwater.

Mitigation Measure

Construction impacts on water quality would be reduced to a level of insignificance by implementation of the following mitigation measures.

4.10-2(a) *All construction projects must comply with individual city and county policies for building and grading operations.*

4.10-2(b) *In addition, local building authorities would be encouraged to require that a spill prevention and control plan be implemented for all construction activities.*

Impact

4.10-3 **Implementation of TCMs 3, 4, 5, 7, 8, and 9 would result in construction and/or improvement of transportation facilities. Flood hazards may be caused by redirected drainage patterns. This would be a significant hydrology impact.**

While most construction of transit lines, HOV lanes, and bicycle facilities would be in highly urbanized areas, the potential exists for areas to experience flood hazards as impervious surface areas increase and the altered drainage patterns and increased surface runoff combine to exceed current drainage capacities. While implementation of each individual control measure may not necessarily result in a substantial stormwater capacity demand and increase flood hazard, the total increased impervious surface area associated with CAP may result in a significant hydrology impact to entire city and/or county storm sewer systems.

Mitigation Measure

This impact would be reduced to a level of insignificance if the following mitigation measures were implemented.

4.10-3(a) *All construction plans associated with transportation facilities would be subject to environmental review and would be reviewed by local jurisdictions to minimize flood hazards and drainage system demand.*

4.10-3(b) *For projects where flood hazards are inevitable, flood control measures and drainage systems would be designed or expanded (flood-proofed) to accommodate new drainage capacity requirements.*

Impact

4.10-4 **Implementation of all the mobility improvements would reduce commuter vehicle trips. This would be a beneficial water quality effect.**

See discussion under Impact 4.10-1.

Mitigation Measure

4.10-4 *None recommended or required.*

Impacts from Traffic Operation Management Control Measures

These measures would not impact water quality because they do not affect the number of vehicle trips nor do they require major construction.

Impacts from User Incentives

Impact

4.10-5 **Each of the User Incentive Control Measures (TCMs 12, 14, and 15) would reduce vehicle trips. This would be a beneficial water quality effect.**

See discussion under Impact 4.10.1.

Mitigation Measure

4.10-5 *None recommended or required.*

Impacts from Indirect Source Review Measures

The Indirect Source Review control program would review land use development projects that attract vehicle trips. Such projects would already be subject to review under CEQA to avoid significant water quality impacts. The Indirect Source Review program is not expected to cause significant adverse water quality impacts.

Impacts from Implementation Support Measures

Impact

4.10-6 **Implementation of TCM 18 could result in degradation of surface water and groundwater quality through construction-related sediment and chemicals. This is a potentially significant impact.**

See discussion under Impact 4.10-2.

Mitigation Measure

4.10-6 *See Mitigation Measure 4.10-2. This mitigation measure would reduce the impact to a less than significant level.*

Impact

4.10-7 **Implementation of TCM 18 would result in construction of high density housing near transit lines. If flood hazards were caused by redirected drainage patterns, this would be a significant hydrology impact.**

See discussion under Impact 4.10-3.

Mitigation Measure

4.10-7 *See Mitigation Measure 4.10-3. This mitigation measure would reduce the impact to a less than significant level.*

Impact

4.10-8 **Implementation of TCMs 17, 18, 19, and 20 would encourage modes of transportation that are alternative to the automobile. This would have a beneficial water quality impact.**

See discussion under Impact 4.10-1.

Mitigation Measure

4.10-8 *None recommended or required.*

Impacts Related to Ozone Excess "No Drive Days"

Impact

4.10-9 **Implementation of G3 and Contingency Measure G4 would encourage modes of transportation that are alternative to the automobile. This would have a beneficial water quality impact.**

See discussion under Impact 4.10-1. Beneficial water quality effects would be intermittent because G3 is a voluntary measure and G4 is a contingency measure.

Mitigation Measure

4.10-9 *None recommended or required.*

Impacts Related to Motor Vehicle Control Measures

Impact

4.10-10 **Implementation of H1, H3 and Contingency Measures H2 and H4 would lead to a reduction in auto-related pollutants released to Bay Area surface and groundwater. This would have a beneficial water quality effect.**

See discussion under Impact 4.10-1.

Mitigation Measure

4.10-10 *None recommended or required.*

Impacts from Market-Based Transportation Control Measures

Impact

4.10-11 **Implementation of market-based control measures would reduce vehicle trips in the Bay Area. This would have a beneficial water quality effect.**

See discussion under Impact 4.10-1.

Mitigation Measure

4.10-11 *None recommended or required.*

Stationary Source Control Measures

Overview of Stationary Source Control Measures

Many stationary source control measures would reduce the amount of hazardous substances handled by the affected industries. However, many stationary source control measures would encourage the use of pollution control devices that use hazardous materials and/or generate hazardous waste. The devices include carbon absorption for ROG emissions control and selective catalytic reduction

(SCR) and ammonia injection (noncatalytic) for NO_x emissions control. Increased storage, handling, and transportation of hazardous substances would create potentially significant water quality impacts due to accidents, spills, leaching, etc.

Impacts from Surface Coatings and Solvent Use Control Measures

Impact

4.10-12 **Implementation of A9, A11, A14, and A16, may result in pollution control devices that generate hazardous waste. This would be a potentially significant water quality impact.**

The additional pollution control devices would include incineration and/or carbon adsorption. The hazardous wastes generated would be spent activated carbon (from carbon absorption units). While implementation of each control measure may not create a significant impact, implementation of all stationary control measures that generate hazardous waste may lead to a significant water quality impact from spills, leaching, and improper handling and disposal of hazardous substances.

Mitigation Measure

Implementation of the following mitigation measures would reduce the impact to a level of insignificance.

4.10-12(a) *Facilities that generate hazardous waste must comply with all applicable federal, State, and local regulations regarding the proper handling, storage, transport, and disposal (including land disposal restrictions) of hazardous waste. These requirements include, but are not limited to, those stated in Section 40 of the Code of Federal Regulations and Title 22 of the California Code of Regulations. Compliance with all necessary regulations would reduce this impact to a level of insignificance.*

4.10-12(b) *Where possible, facilities would use recyclable or regenerative control devices to reduce the amount of hazardous waste generated.*

Impact

4.10-13 **Implementation of A4, A5, A6, A13, A17, and A18 would decrease the amount of hazardous wastes generated at regulated facilities. This would be a beneficial water quality impact.**

Less generation of hazardous waste is expected from reduced solvent clean-up and reduced coating consumption associated with increased transfer efficiency and higher solids coatings (measures A5 and A6). The use of an automatic blanket washer associated with A13 would reduce cleaning solvent usage, which, in turn, would reduce the amount of spent solvent or hazardous waste that would need to be transported off-site. A18 may result in a reduction in hazardous waste generation if suitable substitutes for organic solvents were identified. A17 would result in less improper and illegal hazardous waste disposal at sanitary landfills. Each of the above-mentioned measures would have a beneficial water quality effect.

Mitigation Measure

4.10-13 *None recommended or required.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.10-14 **Implementation of B1, B2, B3, B5, and B6 would encourage the use of pollution control devices that generate hazardous waste. This would be a potentially significant water quality impact.**

See Discussion under Impact 4.10-12.

Mitigation Measure

4.10-14 *See Mitigation Measure 4.10-12. This mitigation measure would reduce the impact to a less than significant level.*

Impacts from Refinery and Chemical Processes Control Measures

Impact

4.10-15 **Implementation of C1, C4, and C7 may result in pollution control equipment that generate hazardous waste. This would be a potentially significant water quality impact.**

See discussion under Impact 4.10-12.

Mitigation Measure

4.10-15 *See Mitigation Measure 4.10-12. This mitigation measure would reduce the impact to a less than significant level.*

Impacts from Combustion of Fuels (NO_x) Control Measures

Impact

4.10-16 **Implementation of measures D1 through D5 would cause many facilities to utilize SCR and ammonia injection (noncatalytic) control technologies. These technologies use and generate hazardous substances, and this would be a potentially significant impact on local water resources.**

Two of the most effective NO_x control technologies include selective catalytic reduction (SCR) and ammonia injection (noncatalytic). For engines using fuels with a high sulfur content and having a high ammonia slip, these NO_x control technologies may cause ammonium bisulfate and ammonium sulfate deposits that plug and corrode the air preheater.` The rinsate from cleaning air preheaters may require treatment to remove ammonia before being discharged.

Mitigation Measure

Implementation of the following mitigation measures would reduce this impact to a level of insignificance.

4.10-16(a) *Local health departments would be encouraged to require facilities that utilize SCR or ammonia injection (noncatalytic) technologies to implement an inspection and maintenance program to eliminate the plugging and corrosion downstream from the reactor.*

4.10-16(b) *All facilities that utilize SCR or ammonia injection (noncatalytic) would comply with all NPDES requirement for industrial wastewater and surface water discharges. Deposits would be removed from the pollution control system using water or steam soot blowing techniques. Wash water may need to be treated as hazardous waste prior to discharge.*

Impact

4.10-17 **Implementation of measures D1 through D6 would cause many facilities to utilize SCR technologies, increasing disposal of spent SCR catalysts material, a hazardous waste. This would be a less than significant water quality impact.**

Increased production of hazardous waste leads to increased potential for spills, accidents, and leaching that could affect surface water and groundwater quality. The life span of SCR catalysts is approximately 7 to 10 years. The increase in hazardous waste disposal related to SCR would be infrequent and would not be substantial relative to the amount of hazardous waste currently generated and disposed. This would be a less than significant water quality impact.

Mitigation Measure

4.10-17 *None recommended or required.*

Impact

4.10-18 **Implementation of measures D1 through D7 would decrease NO_x emissions and decrease the amount of acid deposition in the Bay Area. This would be a beneficial water quality effect.**

Mitigation Measure

4.10-18 *None recommended or required.*

Impacts from Other Industrial/Commercial Process Control Measures

Impact

4.10-19 **Implementation of measures E1 and E3 may require add-on pollution control devices that generate hazardous waste. This would be a potentially significant water quality impact.**

See discussion under Impact 4.10-12.

Mitigation Measure

4.10-19 *See Mitigation Measure 4.10-12. This mitigation measure would reduce the impact to a less than significant level.*

Impacts from Other Stationary Sources Control Measures

Impact

4.10-20 **Measures F1, F4, and Contingency Measure F2, and would encourage the use of pollution control devices that generate hazardous waste. This would be a potentially significant water quality impact.**

See discussion under Impact 4.10-12.

Mitigation Measure

4.10-20 *See Mitigation Measure 4.10-12. This mitigation measure would reduce the impact to a less than significant level.*

Impacts from Intermittent Control Measures

Impact

4.10-21 **Implementation of measures G1 and G2 would result in temporary, decreased use of devices and materials which add to surface and groundwater pollution. This would be a beneficial water quality effect.**

Mitigation Measure

4.10-21 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

Several of the impacts identified above for the mobile source control measures also would be cumulative impacts. As more control measures are adopted and implemented over the Bay Area, more cumulative impacts would occur. Most mobile source control measures would have cumulative beneficial water quality effects by reducing VMT in the Bay Area and decreasing automobile-related pollutants entering the San Francisco Bay. Some of the TCMs that would involve construction may have cumulative impacts to water quality due to construction-related sediment and chemicals. The redirected drainage patterns and incremental increases in impervious surface areas created by some TCMs may cause cumulative flood hazard impacts.

Stationary Source Control Measures

Several of the impacts identified for the stationary source control measures also would be cumulative in nature. As more measures were adopted and implemented over the Bay Area, more cumulative impacts would occur. The CAP would likely result in increased storage, handling and transportation of hazardous waste, and may create cumulative impacts on water quality. Some control measures would reduce hazardous material use and, thus, would have cumulative beneficial effects on water quality.

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1. F. R. Nichols, J.E. Cloern, S.M. Luoma, and D.L. Peterson, U.S. Geological Survey, "Modification of an Estuary," Science, February 7, 1986.

2. State Water Resources Control Board and the Regional Water Quality Control Board, Water Quality Control Plan, San Francisco Bay Basin, Region 2, 1986.

3. Ibid.

4. Department of Water Resources, Division of Flood Management, California Water Supply Outlook, January 10, 1991.

5. State Water Resources Control Board, op. cit.

6. California Air Resources Board, Technical Support Division, The Effects of Oxides of Nitrogen on California Air Quality, March 1985.

7. State Water Resources Control Board, op. cit.

4.11 NOISE

This section discusses potential noise impacts as a result of the proposed Clean Air Plan. The analysis will include identification, description and evaluation of the major Bay Area noise sources and potential noise conflicts that could result from implementation of the proposed plan.

SETTING

Noise Criteria

Exposure to noise can lead to effects such as sleep disruption, shortened attention spans, communication disruption, physiological and psychological stress, and hearing loss. While some people (for example, jackhammer operators) are exposed to noise levels high enough to be physically damaging, many are routinely exposed to noise which adds to their burden of annoyance and stress. Research has found that, to a considerable degree, individual sensitivity to environmental noise is subjective and is not strictly tied to any one measure of intensity, such as perceived loudness. However, it has been established that fairly strong correlations exist between certain measurable noise characteristics and group response.

When communities are exposed to noise, the strength of their collective adverse reaction has been found to depend on three factors: a) the intensity and acoustic character of the intruding noise; b) the intensity and acoustic character of the background noise present before the intruding noise began; and c) the sensitivity of that community to noise. Thus, quantitative indicators of noise must reflect not only loudness but also such factors as tonal character (i.e., noise levels over background) and temporal context (i.e., continuous or intermittent noise).

The three most commonly used noise indicators all express community noise exposure in A-weighted decibels (dBA). The dBA is a measure of sound pressure or loudness closely attuned to the frequency response of the human ear. These indicators also are sensitive to temporal variation in the noise source and/or to the temporal context within which the noise occurs. The equivalent energy noise level (L_{eq}), is the mean of the energy content of noise during the exposure time. Thus, a time-varying noise is considered equivalent to a noise of constant intensity which delivers the same acoustic energy to the ear during exposure. The day-night average noise level (L_{dn}), is the 24-hour L_{eq} with a 10 dBA "penalty" added to nighttime noise (10:00 p.m. to 7:00 a.m.) to account for the greater sensitivity of people during this period. The community noise

equivalent level (CNEL), is very similar to L_{dn}, but adds a 5 dBA penalty to evening noise (7:00 p.m. to 10:00 p.m.) as well. An explanation of the decibel scale and other aspects of acoustics can be found in Appendix E. Also included in Appendix E are examples of typical noise levels measured in the environment and industry.

Regulatory Framework

State of California

The California Department of Health Services (DHS), Office of Noise Control, has studied the correlation of noise levels and their disruptive effects. As a result, the DHS has established four categories for judging the severity of noise intrusion on specified land uses. Noise in the "normally acceptable" range places no undue burden on affected receptors and would need no mitigation. As noise rises into the "conditionally acceptable" range, some mitigation of exposure, as established by an acoustic study, would be warranted. At the next level, noise intrusion is so severe that it is classified "normally unacceptable" and would require extraordinary mitigation measures to avoid disruption. Finally, noise in the "clearly unacceptable" range is so severe that it can not be mitigated. The State uses L_{dn} or CNEL interchangeably to measure noise exposure. Figure 4.11-1 presents State compatibility standards for various land uses. Table 4.11-1 contains land use compatibility noise adjustment factors for extenuating circumstances, also designated by the State.

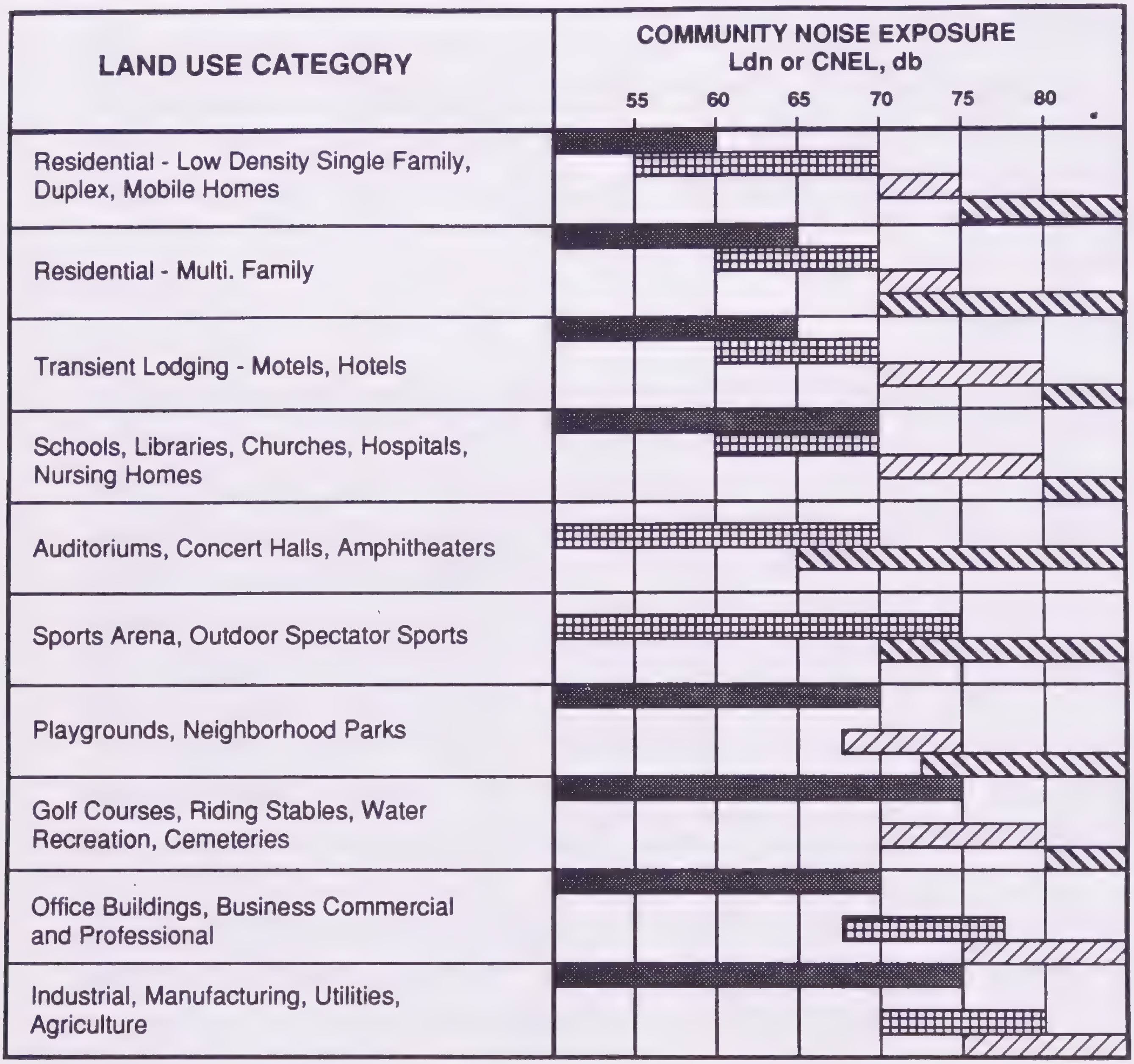
For multi-family residential units, the California Noise Insulation Standard (California Code of Regulations, Title 25, Chapter 1, Subarticle 1, Article 4) requires that the indoor noise levels in a multi-family residential development not exceed 45 dBA CNEL.

Bay Area

In the Bay Area, noise emanates from many different sources. Examples include transportation noise, industrial noise, construction noise, household noise, and human and animal noise. As mandated by State law, Bay Area city and/or county general plans have a noise element to identify and appraise noise problems in their communities. Listed below are examples of policies relating to noise control typically contained in Noise Elements in Bay Area General Plans:

- Areas exposed to existing or projected future noise levels exceeding 60-dBA L_{dn} for residential and 65-dBA for office and retail, shall be designated as noise-impacted areas. All new development proposed within noise-impacted areas, will be subject to requirements

LAND USE COMPATABILITY FOR COMMUNITY NOISE ENVIRONMENTS FIGURE 4.11-1



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should be generally discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: State of California General Plan Guidelines, Office of Planning and Research, June 1987.

TABLE 4.11-1

LAND USE COMPATIBILITY NOISE ADJUSTMENT FACTORS FOR EXTENUATING CIRCUMSTANCES

Type of Correction	Correction Factor (CNEL)	Description
Seasonal Correction	0	Summer (or year-round operation).
	-5	Winter only (or windows always closed).
Correction for Outdoor	+10	Quiet suburban or rural community (remote from Residual Noise Levels from large cities and from industrial activity and trucking).
	+5	Quiet suburban or rural community (not located near industrial activity).
	0	Urban residential community (not immediately adjacent to heavily traveled roads and industrial areas).
	-5	Noisy urban residential community (near relatively busy roads or industrial areas).
	-10	Very noisy urban residential community.
Correction for Previous Exposure and Community Attitudes	+5	No prior experience with the intruding noise.
	0	Community has had some previous exposure to intruding noise but little effort is being made to control the noise. This correction may also be applied in a situation where the community has not been exposed to the noise previously, but the people are aware that bona fide efforts are being made to control the noise.
	-5	Community has had considerable previous exposure to the intruding noise and the noise maker's relations with the community are good.
	-10	Community aware that operation causing noise is very necessary and it would not continue indefinitely. This correction can be applied for an operation of limited duration and under emergency circumstances.
Pure Tone or Impulse	0	No pure tone or impulse character.
	+5	Pure tone or impulsive character present.

Note: Correction factors to be added to measured CNEL values or CNEL values contained in the Standards.

Source: State of California Office of Planning and Research, General Plan Guidelines.

to mitigate such noise throughout the development review process. Mitigation measures may include adequate separation of proposed development areas from noise generators, construction of sound barriers, installation of landscape noise buffers, and installation of noise insulation or other techniques of construction.

- Inability to mitigate CNEL greater than 60-dBA for residential and 65-dBA for office and retail may be grounds for project denial.

- For purposes of determining the extent of land use compatibility and degree of noise mitigation required for exterior noise, a Land Use Compatibility Chart for Exterior Community Noise is provided. This chart may be more stringent than the California State Land Use Compatibility guidelines.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

Noise in the context of public health and welfare implies adverse effects on people and the environment. The CAP would result in changes in ambient noise in the Bay Area on both a regional and local level. Regionally, the CAP would have two major noise effects. Ambient noise would decrease as vehicle miles traveled (VMT) decrease and increase as vehicle speeds increase. (See Traffic and Transportation, Section 4.2 for projected VMT reductions.) Ambient noise levels may increase if greater numbers of trains and buses were utilized. Locally, ambient noise levels may increase temporarily due to construction of transportation systems and high-density housing near transit centers, both of which would be encouraged by the CAP. Noise levels may increase at some industrial and municipal facilities as a result of pollution control equipment installed in response to stationary source control measures. Many stationary control measures would be implemented indoors or would not be related to noise generating devices and would not result in noise impacts.

Standards of Significance

According to the California Environmental Quality Act (CEQA), a project would have a significant noise effect if it would "increase substantially the ambient noise levels for adjoining areas." For this project, significant noise effects are evaluated based on whether CAP control measures would result in conflicts with local ordinances, whether resulting land uses would increase noise levels in areas of sensitive receptors, and whether the land uses encouraged by the plan are compatible with the baseline noise levels in particular areas. Specific analyses were performed to compare existing

and projected traffic noise levels on major Bay Area commuter freeways to State of California and local guidelines for long-term exposure, acceptable interior noise levels, and 24-hour average noise levels.

Mobile Source Control Measures

Overview of Mobile Source Measure Noise Impacts

Implementation of these measures would affect ambient noise levels and would create the potential for noise impacts. Most mobile source control measures are aimed at reducing VMT and traffic congestion, and increasing mass transit ridership in the Bay Area, especially during peak commute hours. Traffic noise would decrease as VMT decreases. Conversely, traffic noise would increase as vehicle speeds increase due to a reduction in congestion. Sensitive receptors along new rail and bus routes would experience an increase in noise levels and, possibly, noise impacts. Sensitive receptors along existing rail and bus lines would experience an increase in temporal noise due to more frequent trips, however, ambient noise levels would not increase and would not cause a significant impact. Other mobile source control measures would have site-specific construction and land use compatibility noise impacts.

Impacts from Employer-Based Trip Reduction Measures

Impact

4.11-1 **TCM 1 and TCM 2 would reduce VMT and, therefore, reduce noise. At the same time these measures would increase vehicle speeds and increase noise. If there is a net increase in ambient noise levels, a significant impact would occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.**

Since on many congested highways, decreased vehicle speeds have reduced noise, existing noise levels may be below original levels that buffers were designed to meet. Rising noise levels due to increased traffic speed in these areas may or may not be significant.

All mobile source control measures that would reduce automobile trips would also reduce traffic, back-ups, and congestion. Noise levels decrease as vehicle volumes decrease. On the other hand, the reduction in congestion results in increased vehicle speeds. Noise levels increase as vehicle speeds increase. Table 4.11-2 shows the relationship between traffic volumes, vehicle speeds, and

TABLE 4.11-2

RELATIONSHIPS BETWEEN TRAFFIC VOLUMES, VEHICLE SPEEDS, AND NOISE

Peak Hour Traffic Volume	Distance to Receptor in Feet	L_{eq} (dBA) at Various Speeds				
		30 mph	40 mph	45 mph	50 mph	55 mph
5,000	100	74.9	77.0	77.9	78.7	79.6
	200	70.2	72.2	73.2	74.1	74.9
	400	66.4	68.4	69.4	70.3	71.1
	800	62.7	64.8	65.7	66.6	67.5
	1600	58.9	61.0	61.9	62.8	63.6
	3200	54.5	56.6	57.5	58.4	59.2
10,000	100	77.8	79.8	80.7	81.6	82.4
	200	73.0	75.1	76.0	76.8	77.7
	400	69.2	71.3	72.2	73.0	73.8
	800	65.6	67.6	68.6	69.4	70.2
	1600	61.8	63.8	64.7	65.6	66.4
	3200	57.4	59.4	60.3	61.2	62.0
15,000	100	79.5	81.6	82.5	83.3	84.1
	200	74.8	76.8	77.8	78.6	79.4
	400	71.0	73.0	73.9	74.8	75.6
	800	67.4	69.4	70.3	71.2	72.0
	1600	63.6	65.6	66.5	67.4	68.2
	3200	59.1	61.2	62.1	62.9	63.7
20,000	100	80.8	82.8	83.7	84.6	85.4
	200	76.1	78.1	79.0	79.9	80.7
	400	72.2	74.3	75.2	76.0	76.9
	800	68.6	70.6	71.6	72.4	73.2
	1600	64.8	66.8	67.7	68.6	69.4
	3200	60.4	62.4	63.3	64.2	65.0
25,000	100	81.8	83.8	84.7	85.6	86.4
	200	77.0	79.1	84.7	80.8	81.6
	400	73.2	75.2	76.2	77.0	81.6
	800	69.6	71.6	72.5	73.4	74.2
	1600	65.8	67.8	68.7	69.6	70.4
	3200	61.3	63.4	64.3	65.1	65.9

TABLE 4.11-2 (Continued)

Peak Hour Traffic Volume	Distance to Receptor in Feet	L_{eq} (dBA) at Various Speeds				
		30 mph	40 mph	45 mph	50 mph	55 mph
30,000	100	82.5	84.6	85.5	86.3	87.2
	200	77.8	79.8	80.8	81.6	82.4
	400	74.0	76.0	77.0	77.8	78.6
	800	70.4	72.4	73.3	74.2	75.0
	1600	66.6	68.6	69.5	70.4	71.2
	3200	62.1	64.2	65.1	65.9	66.7

Notes: Computed with FHWA model using 8-lane highways. All distances measured from roadway centerline. L_{dn} and CNEL can be obtained by adding 5 dBA from seven to ten p.m. and 10 dBA from ten p.m. to seven a.m. See text for explanation of L_{eq} and dBA.

Source: EIP Associates

noise. The noise levels were computed using a Federal Highway Administration noise model, STAMINA 2.0 (FHWA-DP-58-1, April 1982). Specific noise emission factors for California were used in the model.[1] Table 4.11-3 lists current traffic volumes along some of the most highly traveled commuter passages in the Bay Area. Resulting noise levels on these roadways after implementation of the CAP may be interpolated using predicted project VMT and the modeled noise levels in Table 4.11-2.

For example, Table 4.11-3 indicates that peak-hour traffic on Route I-80 between the Powell Street and Route 580 interchange is approximately 23,900 vehicles. As shown on Table 4.11-2, if the average vehicle speed was thirty miles per hour, sensitive receptors within 3,200 feet of the roadway centerline currently would be designated as "noise-impacted." If vehicle speed were increased to 40 miles per hour, ambient noise levels would increase by approximately two decibels. This increase is unacceptable in an area already designated as "noise-impacted," and this change would be a significant noise impact.

For specific projects, noise levels can be estimated by using existing traffic data and noise measurements and then modeling future noise levels based on projected traffic volumes. Significant impacts may occur if net noise levels increase in areas adjacent to freeways and are raised above local or State noise standards for sensitive receptors or if net noise levels increase at all in adjacent areas which are currently designated as noise-impacted. If the net noise levels are reduced, there would be a beneficial noise effect.

Mitigation Measure

4.11-1 *Many mitigation measures for highway noise have been included in the construction of existing highways and adjacent developments. These include adequate separation of proposed development areas from freeways and arterials, construction of sound barriers, installation of landscape noise buffers, installation of noise insulation in residential units and other design techniques, and coordination with local city and county general plans. Existence of these mitigation measures could reduce the noise impacts to a less than significant level. On the other hand, in situations where highway noise is not sufficiently buffered, significant unavoidable impacts may occur.*

Since on many congested highways, decreased vehicle speeds have reduced noise, existing noise levels may be below original levels that buffers were designed to meet. Rising noise levels due to increased traffic speed in these areas may or may not be significant.

TABLE 4.11-3

TRAFFIC VOLUMES ON MAJOR BAY AREA COMMUTER INTERCHANGES

	Annual Average Peak Hour	Approximate Daily Traffic	Distance (feet) to 60-dBA Noise Contour Line
Alameda County Rte. 80, Powell Street and Rte. 580	23,900	266,000	>3200
Contra Costa County Rte. 680, Walnut Creek, Jct. Rte. 24 West and Ygnacio Valley Road	26,000	237,000	>3200
Marin County Rte. 101, Corte Madera and Tamalpais Road	16,000	168,000	>1600
Napa County Rte. 29, Jct. Rte. 12 East and Jct. Rte. 221 North	4,650	42,000	1600
San Francisco County San Francisco-Oakland Bay Bridge*	21,800	242,000	>3200
San Mateo County Rte. 101, SFO and San Bruno*	19,500	250,000	3200
Santa Clara County Rte. 101, Sunnyvale, Lawrence Expressway and Fair Oaks Avenue	17,600	176,000	3200
Solano County Martinez-Benicia Bridge	8,000	76,000	1600

	Annual Average Peak Hour	Approximate Daily Traffic	Distance (feet) to 60-dBA Noise Contour Line
Sonoma County			
Rte. 101, Kastania Road and South Petaluma	8,200	68,000	1600

Notes: Traffic volumes obtained from 1989 Traffic Volumes on California State Highways, Division of Traffic Operations, Caltrans, 1989. Distance to noise contour lines assume vehicle speed of 30 miles per hour.

*1990 traffic volumes obtained from Caltrans.

Impacts from Mobility Improvements

Each of these control measures is expected to increase mobility. TCMs that involve construction of transportation facilities may have temporary construction noise impacts.

Impact

4.11-2 **All of the Mobility Improvement control measures would reduce VMT and, therefore, reduce noise. At the same time, these measures would increase vehicle speeds and increase noise. If there were a net increase in ambient noise, a significant impact would occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.**

See discussion under Impact 4.11-1.

Mitigation Measure

4.11-2 *See Mitigation Measure 4.11-1.*

Impact

4.11-3 **Noise generated by construction of new transit lines and other transportation improvements (TCMs 3, 4, 5, 7, 8 and 9) would cause short-term, local impacts on ambient noise levels.**

Temporary construction activities associated with transportation improvements would increase local ambient noise levels. Table 4.11-4 shows outdoor noise levels likely to be experienced from construction equipment. For example, since noise from localized sources typically falls off by about 6 dBA with each doubling of distance from source to receptor, outdoor receptors within 1,600 feet of a construction site that would have an uninterrupted view of the site would experience noise greater than 60 dBA when noise on the construction site exceeds 90 dBA. The use of such equipment at a construction site surrounded by existing noise-sensitive receptors would result in the intermittent generation of noise far above ambient levels during the construction period and result in a significant noise impact if noise levels were raised above community noise standards. Some disruption of nearby noise-sensitive receptors would be expected.

TABLE 4.11-4

TYPICAL CONSTRUCTION EQUIPMENT NOISE (dBA)[1]

Equipment Type	Noise Level at 50 Feet: Without Noise Control	Noise Level at 50 Feet: With Feasible Noise Control[2]
Earthmoving:		
Front Loaders	79	75
Backhoes	85	75
Dozers	80	75
Tractors	80	75
Scrapers	88	80
Graders	85	75
Trucks	91	75
Pavers	89	80
Materials Handling:		
Concrete Mixers	85	75
Concrete Pumps	82	75
Cranes	83	75
Derricks	88	75
Stationary:		
Pumps	76	75
Generators	78	75
Compressors	81	75
Impact:		
Pile Drivers	101	95
Jack Hammers	88	75
Rock Drills	98	80
Pneumatic Tools	86	80
Other		
Saws	78	75
Vibrators	76	75

[1] Taken from Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, prepared by Bolt, Beranek, and Newman for the U.S. Environmental Protection Agency, December 31, 1971.

[2] Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.

Mitigation Measure

4.11-3 *Construction adjacent to sensitive receptors (residences, hospitals, etc.) would be limited by contract in conformance with local regulations. Local planning authorities would also consider limiting, by contract, construction on weekends or federal holidays. Construction equipment would be required to be muffled or controlled. Local residents would be warned in advance of any extremely loud, temporal noise generation, e.g., rock blasting, through media, public notice, etc.*

This impact would be reduced to some extent by the above mitigation measures, but would remain a significant and unavoidable short-term impact.

Impact

4.11-4 **TCMs 4, 5, and 6 would encourage the use of new rail transit. Localized noise impacts would occur in areas adjacent to the rail lines, if ambient noise levels would exceed local or State noise standards or if the adjacent areas are currently designated as noise-impacted.**

There are many factors that can affect train noise including length, number of locomotives, track types and conditions, speeds, grade crossings, bridges, and other variations in conditions. Light rail or rapid transit does not generate as much noise as traditional railroads that can generate noise levels of approximately 65-100 dBA at 100 feet from the source. BART trains are typically less noisy than freight trains and do not have at-grade crossings. Each area subject to rail transit line would be affected differently depending on the type and speed of the train and the landscape characteristics.

Increased use of existing train lines, such as in TCM 3, would represent a temporal increase in noise but would not result in a significant noise impact. The L_{eq} is the 24-hour equivalent noise level, the mean of the energy content of noise during the exposure time. Thus a time-varying noise, such as trains, is considered equivalent, in terms of L_{eq}, to a noise of constant intensity which delivers the same acoustic energy to the ear during exposure. L_{dn} and CNEL are both based on the 24-hour L_{eq}. Therefore, while receptors along train corridors would experience train noise more frequently, the L_{eq} in areas adjacent to existing train lines would not change and would not cause a significant impact.

Implementation of new rail transit would involve project-specific environmental review. At that time, potential noise impacts would be identified.

Mitigation Measure

4.11-4 *New rail projects would be evaluated by implementing agencies (e.g., Caltrans, BART) for noise impacts during planning and CEQA review. Mitigation measures include adequate separation of proposed development areas from rail lines, construction of sound barriers, installation of landscape noise buffer, installation of noise insulation in residential units and other design techniques, and coordination with local city and county general plans. Implementation of the above mitigation measures would reduce the noise impact to a level of insignificance.*

Impact

4.11-5 **TCMs 3, 8, and 10 would increase bus VMT and decrease auto VMT. The net noise increase would be a less than significant noise impact.**

Urban buses generate noise levels that are greater in magnitude than cars, light-duty vehicles, and, often times, medium trucks. Sensitive receptors along bus routes would experience an increase in temporal noise. However, the ratio of buses to other vehicles is so low, less than one percent of total vehicles in the Bay Area, an increase in bus usage does not result in a substantial increase in ambient noise levels generated by traffic.[2]

Using the noise model STAMINA 2.0, noise levels were predicted for an increased ratio of buses to other vehicles (cars, medium trucks, heavy trucks). Data for fleet mix and VMT were obtained from Predicted California Emissions Data distributed by the State of California. In the model, the number of buses was doubled to twice the current number in the Bay Area. The number of automobiles was decreased accordingly, at an estimated ratio of 30 cars per bus. The percentage of buses was still less than one percent of the total vehicles in the Bay Area. Using these assumptions, the model predicted that noise levels during peak-hour traffic would increase by 0.0-0.2 decibels, which would not be perceptible. Most regions would experience an increase in bus use that is less than double the current usage rate with a negligible increase in ambient noise levels. This would be a less than significant noise impact.

Mitigation Measure

4.11-5 *None recommended or required.*

Impacts from Traffic Operation Management Control Measures

Impact

4.11-6 **TCMs 11 and 12 would increase vehicle speeds on freeways and arterials and, therefore, increase noise levels generated by traffic. A significant impact would occur in adjacent areas if ambient noise levels would exceed local or State noise standards and in adjacent areas currently designated as noise-impacted.**

Table 4.11-2 shows the relationship between vehicle volumes, speed, and noise. An increase in vehicle speeds means an increase noise levels generated by traffic. Table 4.11-3 shows peak-hour traffic volumes on major commuter freeways in the Bay area. A comparison of these volumes to those on Table 4.11-2 indicates that currently, sensitive receptors within 3,200 feet of commuter freeways are likely to experience noise levels above 60-dBA, the State residential noise standard, during peak hours and be "noise- impacted." An increase in vehicle speeds and subsequent noise levels could cause a significant noise impact in populated areas adjacent to Bay Area freeways.

While this section does not include specific data on traffic volumes and vehicle speeds for major Bay Area arterials, increased vehicle speeds would cause an increase in ambient noise-levels and the potential for significant noise impacts in areas adjacent to arterials exists under the above-mentioned conditions.

Mitigation Measure

4.11-6 *See Mitigation Measure 4.11-1. As explained under Mitigation Measure 4.11-7, this impact may remain significant if noise buffering is inadequate.*

Impacts from User Incentives

Impact

4.11-7 **Each of the User Incentive Control Measures (TCMs 12, 14, and 15) would reduce VMT and, therefore, reduce noise. At the same time these measures would increase vehicle speeds and increase noise. If there were a net increase in ambient noise levels, a significant impact would occur where noise levels**

in adjacent areas exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.

See discussion under Impact 4.11-1.

Mitigation Measure

4.11-7 *See Mitigation Measure 4.11-1.*

Impacts from Indirect Source Review Measures

The indirect Source Review control program would review projects that attract vehicle trips. This control measure would not have a direct effect on noise because each project that attracts vehicle trips is already subject to review under CEQA to avoid significant noise impacts. In general, to the extent that Indirect Source Review control measures decrease VMT, there would be a beneficial noise effect.

Impacts from Implementation Support Measures

Impact

4.11.8 **Noise generated by construction of high-density housing (TCM 18) would result in a short-term, localized, significant noise impact.**

See discussion under Impact 4.11-3.

Mitigation Measure

4.11.8 *See Mitigation Measure 4.11-3.*

Impact

4.11.9 **TCM 18 would encourage high density zones at transit stations. The concentration of residential and transit land uses would result in increased noise exposure for sensitive receptors and would cause a significant impact if noise levels exceed local or State noise standards.**

The land uses encouraged by this measure may be located in areas which are exposed to noise levels from transit lines and other sources that are incompatible with local or State land use compatibility noise standards.

Mitigation Measure

Implementation of the following control measures would reduce these impacts to a level of insignificance.

4.11-9(a) *Residential units sited in areas that may potentially be exposed to noise levels greater than the local or State Land Use Compatibility Standards would require a more detailed noise analysis prior to construction.*

4.11-9(b) *Building types identified in the local or State Land Use Compatibility Standards would be located or architecturally designed so the interior noise level would not exceed 45 CNEL with the windows closed.*

4.11-9(c) *Potential noise impacts would be evaluated as part of the design review for all projects. If determined to be significant, mitigation measures would be identified and alternatives suggested. As a minimum, all multi-family housing would comply with Title 24 of the California Administrative Code, requiring indoor noise levels not exceed 45 dBA CNEL.*

Impact

4.11-10 **Implementation of TCMs 17, 18, 19, 20, and 21 would reduce VMT and, therefore, reduce noise. At the same time these measures would increase vehicle speeds and increase noise. If there were a net increase in ambient noise levels, a significant impact would occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.**

See discussion under Impact 4.11-1.

Mitigation Measure

4.11-10 *See Mitigation Measure 4.11-1.*

Impacts Related to Ozone Excess "No Drive Days"

Impact

4.11-11 **G3 and Contingency Measure G4 are voluntary and mandatory "No Drive Days" and would substantially reduce the volume of traffic on freeways and arterials for that specific day. These measures would reduce VMT and increase vehicle speeds. If there were a net increase in ambient noise levels, a significant impact would occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.**

See discussion under Impact 4.11-1.

Mitigation Measure

4.11-11 *See Mitigation Measure 4.11-1.*

Impacts Related to Motor Vehicle Control Measures

Impact

4.11-12 **Implementation of Contingency Measure H4 (Urban Bus System Electrification) would result in decreased ambient noise levels. This would be a beneficial noise effect.**

Electric buses generate less noise than traditional buses with internal combustion engines. While the decrease in ambient noise levels would not be perceptible as a result of contingency measure H4, ambient noise levels would decrease by less than one decibel and sensitive receptors along the bus routes would experience a decrease in temporal noise.

Mitigation Measure

4.11-12 *None recommended or required.*

Impacts from Market-Based Transportation Control Measures

Impact

4.11-13 **Market-based control measures would reduce VMT and increase vehicle speeds. If there were a net increase in ambient noise levels, a significant impact would**

occur where noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.

See discussion under Impact 4.11-1.

Mitigation Measure

4.11-13 *See Mitigation Measure 4.11-1.*

Stationary Source Control Measures

Impacts from Surface Coatings and Solvent Use Control Measures

Impact

4.11-14 **Implementation of A9, A11, A14, and A16 may result in additional pollution control devices that generate noise. This would be a significant noise impact if noise levels in adjacent areas would exceed local or State noise standards or where adjacent areas are currently designated as noise-impacted.**

Pollution control devices expected to be installed in response to these control measures would include incineration and/or carbon adsorption. Incinerators generate noise. The noise generated by such equipment would vary with design and size. Most of this equipment would be added to areas currently subject to industrial noise and some devices would be located indoors.

Mitigation Measure

4.11-14 *Where necessary to comply with local noise standards, local governments would require industries to install sound attenuating devices or sound walls around outdoor, noise generating pollution control equipment.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

None of these control measures would impact ambient noise levels.

Impacts from Refinery and Chemical Processes Control Measures

None of these control measures would impact ambient noise levels.

Impacts from Combustion of Fuels (NO_x Sources) Control Measures

None of these control measures would impact ambient noise levels.

Impacts from Other Industrial/Commercial Process Control Measures

None of these control measures would impact ambient noise levels.

Impacts from Other Stationary Source Control Measures

None of these measures would impact ambient noise levels in the Bay Area.

Impacts from Intermittent Control Measures

Impact

4.11-15 **Implementation of G1 and G2 would result in substantial, temporary, decrease in noise generated, especially due to off-road motorcycles, internal combustion lawn and garden equipment, and motorized pleasure boats. This would be a temporary, beneficial, noise effect of the CAP.**

Mitigation Measure

4.11-15 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

Cumulative impacts and mitigations measures associated with mobile source control measures would be the same as those described above.

Stationary Source Control Measures

Cumulative impacts and mitigation measures associated with stationary source control measures would be the same as those described above.

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1. Data for fleet mix and vehicle trips in the Bay Area is from the California Air Resources Board, Predicted California Emissions Data, 1990.

2. Ibid.

4.12 CULTURAL RESOURCES

This section discusses cultural resources in the Bay Area with respect to the CAP, and identifies impacts which may result from implementation of the various CAP control measures. In general, those control measures that involve land use alterations or new construction are examines for their potential to affect cultural resources.

SETTING

Cultural resources include buildings or sites of architectural, engineering, historic, ethnic, neighborhood, or religious value, or archaeological sites of either prehistoric or historical origin. Designated cultural resources may also include places of natural or scenic values, sensitive environmental habitats, or fossil deposits of paleontological importance.

Cultural resources are listed in a number of inventories, although none of these sources is all inclusive. For example, archaeological sites are recorded only after surveys, and undiscovered archaeological sites may exist in a project area. Among cultural resources inventories are the National Register of Historic Places, the Historic American Buildings Survey, listings at the State Historic Preservation Office, the State Landmarks and Points of Interest listings, and heritage listings kept by various city and county landmarks commissions (or similar organizations) and historical societies. Some cities maintain lists of organizations and agencies which catalog buildings and sites of cultural or historical value. For the nine-county San Francisco Bay Area region, archaeological resources are listed in records maintained by the California Archaeological Inventory at Sonoma State University.

The inventories from the sources listed above may contain sites and structures that have already been lost to natural or human causes. However, the total of existing cultural resources is probably many times greater than the sum of the contents of the inventories. For example, it is likely that only a fraction of the land surface has been surveyed for archaeological resources, while historical properties have not been systematically designated as such in the past, and many municipalities have not performed an inventory of significant structures.

Natural or human causes of damage to cultural or historic resources include development, pollution, or weathering, all of which may serve either to reduce the number of cultural and historical

resources in existence, or diminish the integrity of such resources. Where testing or mitigation monitoring has been conducted as a result of environmental review processes, the evidence consistently indicates that even in densely developed urban areas, archaeological and paleontological resources may retain their integrity and scientific research potential. Further, any single designated cultural resource may combine elements of one or more standing structure(s) in conjunction with buried archaeological deposits.

In relation to the primary issue addressed by the proposed project, poor air quality has a degrading effect upon many building materials, such as brick, terra cotta, marble, metals, and sandstone. The impacts are further aggravated by acid deposition (both wet and dry). There is also an on-going adverse effect from poor air quality upon living species, which may comprise landmarks or sensitive habitat areas.

IMPACTS AND MITIGATION MEASURES

Basis for Impacts

In accordance with the Environmental Checklist Form (Appendix I) of the CEQA Guidelines (1986), this section evaluates the project in terms of its potential to result in a) the alteration of or the destruction of a prehistoric or historic archaeological site; b) adverse physical or aesthetic effects to a prehistoric or historic building, structure or object; c) cause a physical change which would affect unique ethnic cultural values; or d) restrict existing religious or sacred uses within the potential impact area.

Standards of Significance

As described in the Significant Effects list (Appendix G) of the CEQA Guidelines, the project would have a significant effect on cultural and historical resources if it disrupts or adversely affects a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site.

The CAP contains control strategies that may affect cultural resources. Potential impacts are described below along with suggested mitigation measures to reduce potential impacts.

Mobile Source Control Measures

Impacts Related to Mobility Improvements and Motor Vehicle Control Measures

Impact

4.12-1 **Implementation of the following control measures -- TCMs 3, 4, 5, 7, 8, and 9 -- may involve construction within areas of significant cultural or historical value, or in areas with previously undiscovered archaeological sites.**

The control measures cited in impact 4.12-1 involve rail extensions and other transportation facilities such as HOV lanes, bike paths, parking lots, etc. Potential impacts to historic buildings or sites could result from clearing, grading, cut and fill, and covering over either developed or undeveloped areas. Such activities could also cover or destroy archaeological, paleontological, or other cultural resources. The extent to which these activities would affect cultural resources would depend on the location and size of each project, and the existence and nature of possible cultural resources encountered.

New developments would be subject to project-specific environmental review, including analysis of potential cultural resources impacts. It is the responsibility of public agencies to mitigate impacts resulting from construction activities through their discretionary permit authority over site-specific land uses. As stated in Appendix K of the CEQA Guidelines, public agencies should seek to avoid damaging effects on an archaeological resource whenever possible. Conditions should be placed on specific projects to avoid unnecessary adverse impacts on cultural resources.

Mitigation Measures

This impact would be reduced to a less than significant level by implementation of the following mitigation measures:

4.12-1(a) *To determine the existence of cultural resources at potential development sites, and to weigh the significance of such resources, site surveys and records checks would be conducted as part of project environmental review carried out by the approving agency (e.g., transit providers and local governments). On the basis of this information, areas found to contain valuable resources would be developed in a manner designed to preserve the resources to the extent feasible. Alternatively, consideration would be given to relocating projects which conflict with significant cultural or historical resources to different sites where adverse cultural impacts will be reduced or will not occur. Site surveys and records checks as well as avoidance or limitation of archaeological impacts will be performed in conformity with the guidelines contained in Appendix K of the CEQA Guidelines. Such*

would entail, but not be limited to, preparing an excavation plan and securing payments for the costs of mitigating effects on important archaeological resources.

4.12-1(b) *In the event that fossils or artifacts are discovered at development sites, a paleontologist or an archaeologist would be contacted immediately so that an assessment of these resources and a determination of their proper disposition can be made. All such materials would be sampled and collected and, where possible, their source would be determined. In the event that fossils or artifacts are discovered, arrangements for their salvage would be made in such a manner as to minimize construction delays.*

4.12-1(c) *In the event that human remains are discovered or recognized at development sites, excavation or disturbance of a site would be discontinued until the procedures listed in Appendix K of the CEQA Guidelines could be implemented. These procedures include consultation with the County Coroner and, should the remains be of Native American origin, with appropriate Native American representatives.*

The mitigation measures cited above, in combination with compliance with existing State and federal regulations regarding cultural resources, are expected to reduce the level of this impact to a less than significant level. Some existing laws protecting cultural resources include the Antiquities Act of 1906, the Historic Site Act of 1935, the National Historic Preservation Act of 1966, as amended, the National Environmental Protection Act of 1969, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, and the Archaeological Resource Protection Act of 1979.

Based on the types of control measures proposed in the CAP, the project would not be expected to cause physical changes that would affect unique ethnic cultural values on a regional level or to restrict existing religious or sacred uses within the potential impact area. Therefore, the project's operation would not be expected to cause a significant regional cultural or historical resources impact.

Impacts Regarding Implementation Support Measures

Impact

4.12-2 **Changes in land use policies associated with implementation of TCM 18, "High Density Zones at Transit Stations," may entail development that affects areas or neighborhoods of ethnic cultural or historical value. This would result in a significant impact on cultural resources.**

TCM 18 would encourage higher density, cluster development along mass transit lines, some of which could involve new construction of buildings and related infrastructure. It may cause increased residential development and employment densities in certain areas. This result could threaten homes or buildings with historic characteristics. As with construction impacts above, the severity of this impact would depend on the magnitude of development changes and the existence and nature of historic resources encountered in the areas to be developed or re-developed. It should be noted that development or re-development associated with the CAP is not expected to generate impacts on cultural resources beyond those expected to occur as a result of population growth and associated infrastructure development in the region.

Mitigation Measures

4.12-2 *Local planning agencies should include preservation of cultural resources as a criterion in evaluating areas at transit stations for high-density zoning, thereby reducing this impact to a less than significant level.*

Stationary Source Control Measures

In general, stationary source control measures proposed in the CAP would not involve construction in previously undeveloped areas or alterations of existing land uses. Therefore, these CAP components are not expected to create an impact on cultural resources.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

The CAP is not expected to cause direct or indirect significant adverse impacts on cultural resources. To the extent that implementation of the CAP indirectly causes infrastructure development or other facilities to be built, proper site selection procedures can minimize potential impacts on cultural resources. Local and State jurisdictions with review authority such as municipalities, Caltrans, and other agencies are responsible for implementing proper site selection controls to ensure the protection of cultural resources. Although cumulative impacts on cultural and historic resources may occur, these would be the result of programs and activities other than the CAP.

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4.13 VISUAL QUALITY AND AESTHETICS

SETTING

Introduction

This section of the Draft EIR summarizes the existing visual character of the nine-county project area and addresses the potential visual impacts of implementing measures proposed in the Clean Air Plan (CAP). Changes in transportation, industrial, and manufacturing processes brought about by the CAP may result either directly or indirectly in visual impacts.

Evaluation of changes in the visual environment is generally subject to individual preferences. Visual changes are perceived differently according to the visual sensibility of the observer. Therefore, a visual change may be considered to be adverse by one viewer and beneficial by another.

The analysis in this Draft EIR focuses on changes to the visual field resulting from programs and projects that would improve air quality. For example, the intensification of urban densities near transit centers to discourage the use of private automobiles could impact the visual character of the areas affected. Impacts that can be anticipated at this time are discussed. Where projects have not been sufficiently defined, the need for additional future project-specific environmental review is identified.

Visual Character of the Bay Area

The San Francisco Bay Area is characterized by distinct natural and man-made features. Landform, sky, water, vegetation, the built environment, and climatic features contribute to the inherent visual character of the region. The study area can be generally described in terms of geographic units. The coastal margin is characterized by rugged and rolling hills and narrow beaches within the study area. Vegetation consists of low grasses and evergreen tree forests. San Francisco Bay is the most prominent visual feature of the study area. Each of the counties in the study area front on the Bay. Within this area, urban centers have been established, dominated by buildings and structures such as the bridges that provide links across the Bay. Rolling northwest-southeast trending hills separate the east and west portions of the study area. These hills allow spectacular views of the

region and create a physical barrier to fog which shrouds the coastal areas in summer. Low valleys in the Santa Clara area have been converted from agricultural uses to high-tech industry.

Visibility

Visibility is affected by local or regional air quality. Reduced visibility is attributable to natural sources including wind-blown dust, smoke, fog and salt particles. Visibility is also reduced as a result of combustion by-products, industrial and automobile emissions (sulfur oxide and NOx), and aerosols produced in manufacturing (vehicle coating, wood coating, semi-conductor production). Regional haze obscures views of landforms, structures, blue sky, forests and other notable features and is the most observable indication of poor air quality.

The State of California Air Resources Board (ARB) considers visibility in its air quality standards. From 1967 until 1989, determinations of visibility were made by human observation. Particles which were present in sufficient amount to reduce visibility to less than 10 miles when relative humidity is less than 70 percent determined compliance with the ARB standards. In November, 1985 ARB initiated a review of the visibility standard, and directed that ARB staff develop a method using instruments rather than human observation to measure visibility. A new method was adopted in October 1989. This method determines visibility impairment by measuring the absorption of light due to particles. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze.[1]

IMPACTS AND MITIGATION MEASURES

Standards of Significance

The California Environmental Quality Act (CEQA) defines a significant adverse impact on the environment as a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project. . . ." Aesthetic impacts are defined in Appendix G of the CEQA Guidelines as "having a substantial, demonstrable negative aesthetic effect." In relationship to visual quality, the level of significance of the impact is also affected by the social relation of the impact. For example, a visual change to the environment may be considered significant when viewed at great distance, such as when viewed by motorists from a scenic viewpoint or highway. It is, therefore, necessary to consider the social context in which the proposed changes in the visual environment would be viewed, including the duration of exposure.

Potential visual impacts discussed in this DEIR are considered to be significant if the visual quality of the area would be substantially degraded. Substantial increases in diminished visibility due to combustion emissions, or industrial/manufacturing processes would constitute a significant visual impact. Construction of projects intended to improve air quality, such as with the construction of High Occupancy Vehicle lanes or light rail transit systems, may result in secondary significant visual effects. Significant visual impacts would also result if measures or policies of the CAP conflict with scenic quality policies or adopted conditions of other agencies.

Overview of Visual Impacts of the CAP

Impact

4.13-1 **Implementation of mobile and stationary source control measures would decrease air pollutant emissions and smog, thereby improving air quality and increasing visibility. The region's features would be visible more often and for a greater duration as combustion emissions decrease.**

Control measures would result in a beneficial visual impact to the overall appearance of the Bay Area as viewed by observers from all vantages. Clarity of long distance views, which might be obscured by regional haze without benefit of CAP measures, would improve. Mitigation measures would not be necessary.

Mitigation Measure

4.13-1 *None recommended or required.*

Mobile Source Control Measures

Impacts from Employer-Based Trip Reduction Measures

Impact

4.13-2 **Employer-based trip reduction measures would decrease automotive emissions, thereby improving air quality and increasing visibility.**

Trip reduction measures would result in a beneficial visual impact to the overall appearance of the Bay Area, as described above.

Mitigation Measure

4.13-2 *None recommended or required.*

Impacts from Mobility Improvements

Impact

4.13-3 **Mobility improvements would result in decreased air emissions, improved air quality, and increased visibility. This would be a beneficial impact.**

Mobility improvements would include alternative modes of transportation including expanded railway and ferry service, improved bicycle access, construction of rideshare and bus lanes, such that use of the automobile is decreased. The net result would be improved air quality and greater visibility over longer distances and improved aesthetic quality as fewer combustion particles would be released. This would be a beneficial impact not requiring mitigation.

Mitigation Measure

4.13-3 *None recommended or required.*

Most proposed mobility improvements (TCMs 3, 6, 7, 9, 10 and 11) would not result in significant adverse visual impacts. Visual quality impacts would occur only if implementation of the improvements resulted in detrimental local or regional visual effects such as the blockage of views.

Impact

4.13-4 **The addition of HOV Lanes (TCM 8) could result in adverse visual impacts if trees, landscaping, medians or soundwalls were removed to accommodate widened roadways. New soundwalls constructed along freeways could also result in adverse visual effects if view obstruction from adjacent land uses occurs.**

Mitigation Measure

4.13-4 *Visual features such as trees, landscaping, planted medians and soundwalls should be inventoried and evaluated for visual importance during environmental review of an HOV lane or rail project. Wherever possible, visually important features would be retained. Trees, shrubs and groundcover should be replaced by fast-*

growing species that are tolerant of the freeway conditions. A maintenance program should be designed and implemented to ensure survival of the plantings.

The proposed mitigation measure (4.13-4) would diminish and potentially eliminate the impact. Final determinations would be made during environmental review of specific proposals. Until later CEQA review, this impact must be regarded as unavoidable.

Impact

4.13-5 **The construction of rail extensions (TCM 4) and rail access improvements (TCM 5) could result in adverse visual impacts if design, construction or operation of new systems resulted in substantial visual change, incompatible land uses, conversion of open space lands, removal of vegetation, and/or blockage of views.**

The degree of impact would be determined as specific improvements were designed and undergo environmental review.

Mitigation Measure

4.13-5 *Proposed improvements would be subject to separate local and regional environmental review procedures, depending upon jurisdictional requirements. Projects may be subject to review by design or planning commissions, city or community councils, and public works departments.*

Mitigation measures cannot be identified until route locations for rail improvements are determined. Environmental review requirements of local and regional jurisdictions would prevail in evaluating environmental impacts and identifying appropriate mitigation measures. Agency and public comment would be received during scoping and public review of proposed rail projects. The degree to which mitigation measures would diminish impacts cannot be determined without knowledge of specific impacts. Until later CEQA review, this impact must be regarded as significant.

Impacts from Traffic Operation Management Control Measures

Proposed TCMs 11 and 12 would not result in significant adverse visual impacts.

Impacts from User Incentives

Proposed TCMs 13, 14, and 15 would not result in significant adverse visual impacts.

Impacts from Indirect Source Review Measures

Proposed TCM 16 would not result in significant adverse visual impacts.

Impacts from Implementation Support Measures

Proposed TCMs 17, 18, 19, 20 and 21 would not result in significant adverse visual impacts.

Impacts Related to Ozone Excess "No Drive Days"

Proposed control measure G3 and Contingency Measure G4 would not result in significant adverse visual impacts.

Impacts Related to Motor Vehicle Control Measures

Proposed control measures H1 and H3, and Contingency Measure H2 would not result in significant adverse visual impacts. However, urban bus system electrification (Contingency Measure H4) would adversely affect the visual quality of local areas.

Impact

4.13-6 **Electrification of the urban bus system would result in adverse visual impacts if the system utilized overhead wires.**

The increase in visual complexity of overhead utilities including bus wires would be a detrimental visual impact. This impact would be most severe where at intersections where several routes converge and where "spider-web" wire configurations result in overhead visual clutter. In some cases, installation of overhead utility wires would conflict with policies of local or regional agencies which require new utility lines to be put underground.

Mitigation Measure

4.13-6 *In extremely sensitive visual areas, buses that operate on dual power sources (electric and fuel) should be utilized in order to eliminate overhead wires.*

While in most areas the visual impacts of overhead wires could not be mitigated, buses could use internal combustion engines through visually-sensitive areas. This concept is practical in Seattle, Washington. In all other areas, where visual effects would be significant, they would be unavoidable.

Impacts from Market-Based Transportation Control Measures

Proposed Market-Based Measures would not result in significant adverse visual impacts as they would be based on fees for use of private automobiles. Visual quality impacts would occur only if implementation of these market-based transportation control measures included construction of toll plazas or other structures that could have negative visual effects such as view blockage.

Stationary Source Control Measures

Impacts from Surface Coating and Solvent Use Control Measures

Impact

4.13-7 **Surface coating and solvent use control measures would decrease air emissions from industrial and commercial manufacturing operations and result in improved air and visual quality. This would be a beneficial impact.**

Mitigation Measure

4.13-7 *None recommended or required.*

Impacts from Fuels/Organic Liquids Storage and Distribution Control Measures

Impact

4.13-8 **Emissions control, storage and distribution measures would result in a beneficial visual impact as air quality is improved and regional haze decreases.**

Mitigation Measure

4.13-8 *None recommended or required.*

Impacts from Refinery and Chemical Processes Control Measures

Impact

4.13-9 **Improvements in the storage and of chemicals and fuels would control emissions and result in improved air quality and reduce regional haze. This would be a beneficial impact.**

This is a beneficial impact not requiring mitigation.

Mitigation Measure

4.13-9 *None recommended or required.*

Impacts from Combustion of Fuels (NOx Sources) Control Measures

Impact

4.13-10 **Control of combustion emissions would directly improve air quality and reduce regional haze. Visibility of the regional's visual features would improve. This would be a beneficial impact.**

Proposed improvements would not result in significant adverse impacts unless implementation of these measures included the construction of facilities which could impact local or regional visual quality. NO_x emissions are visible in the air as a whiskey-brown colored haze. Visible poor air quality (smog) is characterized by this brown haze. As the amount of NO_x emissions decreases with these control measures, the aesthetic quality of the region would improve. This is a beneficial impact not requiring mitigation.

Mitigation Measure

4.13-10 *None recommended or required.*

Impacts from Other Industrial/Commercial Processes Control Measures

Impact

4.13-11 **Improved manufacturing techniques would result in improved air quality and decrease regional haze, thus benefiting the regional visual character.**

Proposed improvements would not result in significant adverse impacts unless implementation of these measures included the construction of facilities which could impact local or regional visual quality. Beneficial visual impacts would occur through emissions control and reduction of regional haze. Views distance would increase and features would be seen for a longer duration. This impact would not require mitigation.

Mitigation Measure

4.13-11 *None recommended or required.*

Impacts from Other Stationary Source Control Measures

Proposed review rules and plans would not directly impact visual quality either locally or regionally.

Impact

4.13-12 **Other stationary source control measures would improve air quality and reduce regional haze. This would be a beneficial impact**

Mitigation Measure

4.13-12 *None recommended or required.*

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Mobile Source Control Measures

Impact

4.13-13 **Decreasing use of private motor vehicles may result in visual impacts as vehicles are abandoned or parked for long periods of time.**

As the use of motor vehicles declines under the measures proposed by the CAP, utilization of parking garages and surface lots in urban areas may decline. Parking lots and structures may be underutilized, leading to conversion of land use. If the lots were converted to open space, a positive visual condition would occur. In the event that incompatible land uses occupied these sites, a potentially negative aesthetic impact would occur. Abandoned vehicles would contribute to visual blight in local or regional areas depending on the method of disposal of the vehicles.

Mitigation Measure

4.13-13 *Surface parking lots and parking garages should be converted to other uses such as urban parks or building opportunity sites. Subsequent development would be subject to environmental review to minimize visual impacts. Abandoned vehicles should be towed after local parking authorities determine that the vehicle has been abandoned. Wrecking yards would be screened from view by walls, fences, landscaping or combinations of these. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Impact

4.13-14 **Local visual quality could be affected as trip reduction measures de-emphasize regional employment and commercial centers and result in an intensification of urbanized land uses in satellite areas or near transit centers.**

Trip reduction measures in the CAP and the Regional Transportation Plan would reduce parking needs and de-emphasize existing commercial and regional employment centers. People would be more likely to work in satellite areas or in their homes using telecommunications to facilitate their work. Visual quality of local and regional areas may be affected as a shift in land uses occurs. Higher density urban residential opportunities would be expected to establish near regional transit centers for people commuting to city centers, and other types of intensification may occur in regional nodes. While this impact would change the existing visual character, it is not known whether the impact would be adverse. Environmental review conducted for specific projects would evaluate the potential visual impacts of increased urbanization.

Mitigation Measure

4.13-14 *During CEQA review and architectural review by local governments, design guidelines which direct building height, massing, setbacks, stepbacks, sunlight penetration and building materials should be applied to new residential housing or regional employment nodes that are constructed as a result of implementation of the CAP. Implementation of this mitigation measure would reduce this impact to a less than significant level.*

Stationary Source Control Measures

There would be no cumulative visual impacts of the stationary source control measures.

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1. California Air Resources Board, California Air Quality Data, January-February-March 1989; pp. 3-5.

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5. CEQA CONSIDERATIONS

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5.1 GROWTH INDUCEMENT

CEQA identifies a project to be growth-inducing if it fosters economic or population growth; extends urban services in a previously unserved or underserved area; extends a major transportation corridor into a previously unserved or underserved area; or removes a major obstacle to development and growth.[1] Secondary growth generally relates to retail and other service employment related to new development activity. However, new employment caused by new commercial development and new population caused by new residential development represent direct forms of growth. These growth increments expand the size of local markets for labor or retail spending and induce additional economic activity in the area to capitalize on the direct growth. Growth may also be induced by lowering or removing infrastructural barriers to growth, improving transportation access to an area, or by creating amenities, such as a recreational facility, that attract new population or economic activity.

Typically, the growth-inducing potential of a project would be a significant impact if it fostered growth or a concentration of population, or created the capacity to accommodate growth above and beyond what was permitted by the relevant general plans or was contained in growth projections of independent regional planning agencies. However, the creation of growth-inducing potential does not automatically lead to growth, whether it would be below or above a projected level. Growth at the local level is regulated by the land use policies of local governments in California, but growth can only happen through capital investment in new economic opportunities by the private or public sectors (predominantly the former). Development pressures are created by the desires of investors to mobilize their resources in a particular region or locality. These pressures help to structure the local politics of growth and the local jurisdiction's posture on growth management and land use policy. The growth-inducing potential or pressure created by a project is, therefore, mediated by the locality itself.

The 1991 Clean Air Plan sets in place policies that will help achieve State and federal standards for clean air. These policies and implementation measures that relate to indirect source review, zoning and design policies may affect the distribution of population, employment or housing growth. This could have physical environmental effects depending on the changes to land use patterns.

The CAP would induce substantial growth around transit centers and corridors combining employment and residential centers. It is anticipated that the CAP would induce growth in the region, and that it would tend to focus growth and development along transit corridors. The CAP could bring about a population increase of 403,300 by 2010 (see Impact 4.4-10).

The CAP would induce an employment loss of approximately 11,130 jobs through stationary source control measures. This loss in employment would be more than offset by an increase in employment opportunities of approximately 14,900 induced by the implementation of the CAP transportation control measures. The net new permanent employment from implementation of the mobile and stationary source controls would be approximately 3,770 jobs. Because of low unemployment in the Bay Area, these new positions would most likely be filled by individuals relocating in the Bay Area from other areas.

Direct and indirect employment induced by construction, related to implementation of the CAP, would provide approximately 66,250 temporary jobs over the next ten years. Based on the demand for construction workers in the Bay Area during this period, these jobs may be filled by residents of the Bay Area or by individuals relocating in the Bay Area from other areas. Because the demand for construction workers in the future is highly speculative, it is not possible to predict whether construction-related CAP employment would be growth inducing.

Implementation of the CAP would result in the construction of new transit corridors such as HOV lanes, expansion of rail lines and transit corridors. This would lead to new growth occurring along these expanded transit corridors. Mixed-use development clusters would form along these corridors in order to meet CAP policies such as Indirect Source control measures and trip reduction measures. The CAP could cause growth inducement in areas that are currently suburban in character or underdeveloped as growth is channeled into transit corridors.

The CAP would direct and focus growth rather than allow growth to occur randomly in areas that are not served by efficient transit modes. In addition to growth induced in the Bay Area, the CAP would indirectly induce growth in adjacent communities outside the region. This could occur as Indirect Source Control measures increase development costs in the region causing displacement of residential and commercial development. The effect of the CAP on adjacent communities

cannot be easily determined. Many interdependent demographic and economic variables prevent a reasonable estimate of these regional impacts.

5.2 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The purpose of the CAP is to implement control measures that would lead to attainment of the federal and State air quality standards by the earliest practicable date. According to CEQA, environmental analysis of the CAP must include a discussion of whether or not the proposed project would result in short-term uses of environmental resources at the expense of long-term productivity of these resources. The CAP is not expected to increase local short-term uses that would affect long-term productivity. By attaining State air quality standards, the CAP would enhance long-term productivity in the Bay Area.

The long-term effect of the CAP would be improved air quality. Improved air quality would be a beneficial effect to society, resulting in improved public health and welfare and improved productivity for the Bay Area. To achieve this effect, there would be some short-term adverse impacts from implementation of the CAP, as described in Chapter 4. These short-term impacts include the commitment of financial, material, and human resources, in addition to environmental resources. Implementation of the mitigation measures associated with the significant adverse impacts identified in Chapter 4 would ensure that impacts were reduced to a less than significant level or to the least significant level possible.

As Section 4.6 indicates, potential long-term and irreversible impacts to groundwater exist from the use of methanol and other hazardous substances, however, this is not expected to have a significant effect on long-term productivity. As discussed in Section 4.10, many pollution control devices use water to comply with control measures proposed in the CAP. This is currently considered a short-term adverse impact due to drought conditions. The impact of increased water usage would not be considered a long-term impact on productivity because the conditions would go away when normal water supplies return. Therefore, implementation of the CAP is not expected to have adverse effects on long-term productivity in the area.

Implementation of the CAP would maintain and even increase long-term productivity of the environmental resources, in addition to air quality and public health. Implementation of the CAP

mobile source control measures would substantially reduce the consumption of natural resources, especially nonrenewable fossil fuels, for transportation in the Bay Area. Similarly, transportation and congestion problems would be reduced substantially as a result of the CAP mobile source control measures.

5.3 SIGNIFICANT IRREVERSIBLE EFFECTS

According to the CEQA Guidelines, uses of non-renewable resources during the initial and continued phases of a project may be irreversible since a large commitment of such resources makes removal or non-use thereafter unlikely. Primary impacts of projects and, particularly, secondary impacts (such as highway improvement that provide access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with projects. The following discussion evaluates irretrievable commitments of resources to assure that such consumption is justified.

In general, the CAP does not involve a large commitment of non-renewable resources. CAP control measures may involve short-term increased energy use associated with construction projects such as rail extensions or development along transit corridors. Long-term increased energy use related to control measures in the CAP include emissions abatement devices or additional transit facilities and services. The net effect of the CAP would be to decrease consumption of non-renewable resources by reducing fuel consumption. Further, when compared to growth and related development expected to occur in the region, the project's effect on irreversible uses of non-renewable resources would be minimal. Commitments of non-renewable resources are expected to occur in areas of existing development as opposed to areas that were previously undeveloped or inaccessible. Non-fuel, non-renewable resources would not be directly affected by the proposed project.

Control measures in the CAP include alternative fuels requirements, in addition to other measures that may result in an increase in hazardous materials use and hazardous waste generation. To this extent, the CAP may cause an increased likelihood of environmental accidents which could damage environmental resources. Mitigation measures identified for the project and current regulatory requirements, however, are expected to reduce the risk associated with the use of alternative fuels, and increased use and disposal of hazardous substances to a less than significant level. Also, there

would be a degree of reduced environmental risk achieved due to a reduction in the transportation, use and disposal of hazardous materials (such as fuels, benzene, and solvents) in the region.

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1. CEQA Guidelines, Section 15126(g).

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6. PROJECT ALTERNATIVES

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6.1 INTRODUCTION

The CEQA Guidelines, Section 15126 (d), requires that an EIR describe a range of reasonable alternatives to the proposed project that could feasibly attain the basic objectives of the project. Further guidance provided in CEQA for the selection of alternatives states:

> "The discussion of alternatives shall focus on alternatives capable of eliminating any significant adverse environmental effects or reducing them to a level of insignificance, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."(Section 15126 (d)(3))
>
> "The range of alternatives required in an EIR is governed by "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision-making and informed public participation. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative." (Section 15126 (d)(5))

The CEQA Guidelines, Section 15126 (d)(2), requires that the "No Project" alternative and its impacts be evaluated. If the environmentally superior alternative is the "no project" alternative, an environmentally superior alternative selected among the other alternatives must be identified.

ISSUES IN THE SELECTION OF THE ALTERNATIVES

When framing the project alternative to be analyzed in the CAP EIR, the BAAQMD had to balance conflicting requirements of CEQA and the California Clean Air Act (CCAA). CEQA requires than an EIR examine a reasonable range of project alternatives that could feasibly achieve the basic objectives of the project. The basic objective of the CAP is to reduce emissions of carbon monoxide and ozone precursors in order to achieve and maintain State ambient air quality standards by the earliest practicable date. Because the Bay Area is designated as a "severe" area under the CCAA, the CAP must include all feasible control measures. A CAP that did not include all feasible control measures would not meet requirements of the CCAA and would likely be rejected by the Air Resources Board. Therefore, the BAAQMD determined that project alternatives significantly less stringent than the proposed CAP would not be feasible. Similarly, alternatives that are significantly more stringent than the proposed CAP are not considered feasible. This is because in order to meet the requirements of the CCAA for severe areas, the CAP already

includes all feasible control measures. The net result is that the range of feasible alternatives for this project is much narrower than is generally the case in CEQA documents.

The BAAQMD applied various criteria in selecting alternatives to be analyzed in the CAP EIR. The selection was limited by the following concerns:

1. The alternatives must meet the basic requirements of CEQA and the California Clean Air Act.

2. The BAAQMD should have the authority, or have a reasonable expectation of obtaining the authority, to implement or facilitate the implementation of the control strategy.

3. Sufficient data must be available to allow environmental analysis of the alternative.

Numerous alternatives in addition to those selected for review were considered for analysis. Many of these alternatives were rejected because they could not feasibly attain the basic objective of the project. Due to the comprehensive nature of the CAP in response to CCAA requirements for severe areas, all alternatives reviewed in the selection process were to some degree already incorporated in the CAP. Development of alternatives, therefore, focused on emphasizing certain control measures in relation to others or on changing their implementation schedule. For example, a "compact growth" alternative, considered early in the selection process, would have placed greater emphasis on implementing a strict Indirect Source Review rule which would result in conversion of surplus commercially zoned land along transit corridors to high density residential. In addition, General Plan - Air Quality Elements (TCM 19) and the High Density Zones at Transit Stations (TCM 18) might also play a larger role in the development of a "compact growth" alternative. These control measures were reviewed in the CAP analysis and, therefore the EIR provides a partial assessment of the environmental impacts of a "compact growth" scenario. In this respect, analysis of the proposed project provides some insight into the environmental impacts of alternatives that were rejected in the selection process.

The three alternatives selected for analysis in this chapter include:

- Alternative 1 - "No Project"
- Alternative 2 - "Accelerated Market-Based TCMs"
- Alternative 3 - "ROG-First Control Strategy"

The "No Project" alternative is being analyzed as a requirement under CEQA. The "No Project" alternative is not a legally-viable alternative with respect to the California Clean Air Act (CCAA), because the CCAA requires that the BAAQMD adopt an attainment plan. The emission reductions required under the CCAA, as discussed in Section 3, Project Description, clearly go beyond emission reductions that could be achieved under a "No Project" alternative.

The BAAQMD selected the "Accelerated Market-Based TCMs" alternative as an alternative to the proposed project because the public showed a great deal of interest in market-based control measures during the EIR scoping process. This alternative would neither add nor delete control measures proposed in the CAP, but rather, it would change the implementation schedule, moving Phase 3 market-based TCMs to Phase 1. In the proposed CAP, market-based TCMs are proposed to be implemented in Phase 3, after 1997, whereas the "Accelerated Market-Based TCMs" Alternative assumes that the market-based TCMs would be implemented in Phase 1, before 1994.

The reader should understand why the BAAQMD scheduled the market-based TCMs for Phase 3 of the CAP. The market-based TCMs are very controversial politically, and the BAAQMD estimated that legislative authority to implement the market-based measures could not realistically be expected to be granted before 1997. "Public acceptability" was one of the criteria the BAAQMD used in developing the CAP's adoption and implementation schedule. The "Accelerated Market-Based TCM" alternative analysis assumes, contrary to the belief of the BAAQMD, that legal authority to implement these measures could be in place before 1994.

The BAAQMD selected the "ROG-First Control Strategy" alternative for several reasons. First, it would be consistent with the BAAQMD's historical attainment strategy, as set forth in the 1982 Bay Area Air Quality Plan (AQP), of primarily reducing ROG emissions in order to reduce ambient ozone concentrations. Second, recent BAAQMD air quality modeling, performed as part of the CAP process, indicates that an ozone attainment plan that only reduces ROG would reduce the potential for ozone "hotspots" (see Section 4.1, Air Quality, Impact 4.1-2). While the "ROG-First" alternative postpones NO_x control measures, conflicting with Section 40914 (a) of the CCAA, which requires plans to reduce emissions of nonattainment pollutant precursors, it would be in compliance with Section 40920 (a)(4) of the CCAA, requiring districts with severe air pollution to include measures in the attainment plans "sufficient to reduce overall population exposure to

ambient pollutant levels in excess of the standards." The ROG-First Control Strategy's potential to reduce ozone hotspots satisfies this latter requirement of the CCAA.

An analysis of the impacts associated with each of the project alternatives, and a comparative analysis of the impacts of each project in relation to the 1991 CAP and the other alternatives, are described and evaluated in this section. Those environmental impacts considered to be significant under the proposed alternatives are addressed.

6.2 "NO PROJECT" ALTERNATIVE

DESCRIPTION

Under the "No Project" alternative, it is assumed that no new mobile source or stationary source control measures would be adopted. Under this alternative, the only emission reductions realized in the Bay Area would be from: 1) stationary source control measures adopted to date, 2) already-adopted ARB measures regarding motor vehicles (see Section 3, Project Description, Table 3-4, 1 through 16), and 3) TCM contingency measures from the 1982 AQP that were adopted by 1990 and can reasonably be expected to result in emissions reductions without any further action. The BAAQMD has determined that the following contingency measures from the 1982 AQP ("federal TCMs") meet the last criteria and should be included in the "No Project" alternative:

FTCM 13	All Bridge Tolls to One Dollar
FTCM 15	Increase State Gas Tax by Nine Cents Per Gallon
FTCM 17	Continue Post-earthquake Ferry Service
	Continue BART Expanded Peak Period Service
FTCM 21	Regional Transit Coordination
FTCM 22	Voluntary Employer Transit Subsidies
FTCM 23	Voluntary Employer Ridesharing Promotion
FTCM 24	Expand Arterial Signal Timing
FTCM 25	Renew Previous Signal Timing
FTCM 26	Freeway Incident Management
FTCM 27	MTC Guidance on Local TSM Programs
FTCM 28	Local TSM Implementation

IMPACTS

Air Quality

Emission reductions of ozone precursors and carbon monoxide resulting from the "No Project" alternative would be considerably less than those achieved if the CAP were implemented.

Consequently, progress toward attainment of State and federal ozone and CO standards would be prolonged. Adoption of the No Project alternative would eliminate or reduce potential impacts identified in the air quality analysis of the proposed project.

Emission reductions under the No Project alternative would be similar to those represented in Section 4.1, Air Quality, Table 4.1-2. Table 4.1-2 projects future emission reductions, anticipated without implementation of the proposed CAP. However, these projections, contrary to the assumptions made for the No Project alternative, take credit for emission reductions achieved through control measures to be adopted by the ARB and federal programs. Table 4.1-2 shows a decline in emissions of ROG, NO_x, and CO through the year 2000. While emissions from stationary sources would increase through the year 2000, these increases are more than compensated for by large reductions in mobile source emissions.

The emission inventories for the No Project Alternative would be somewhat higher than those presented in Table 4.1-2. Emission inventories for stationary sources would essentially remain unchanged from those presented in Table 4.1-2. Emission reductions achieved under the No Project alternative would be less than those achieved under the implementation of the CAP because the No Project alternative does not take credit for ARB and federal programs adopted in the future. Mobile source control measures which may be adopted by the ARB in the future and which would contribute to emission reductions in the CAP, but not in the No Project alternative, are listed in Section 3, Project Description, Table 3-4. These ARB measures identify three control measures which are feasible measures for 1991 and 1992 and eight control measures which would be feasible after 1992.

Emission reductions from federal TCM (FTCM) contingency measures from the 1982 AQP (FTCMs 13 through 28) have been divided into two categories. Those FTCMs that were adopted by 1990 and can reasonably be expected to result in emissions reductions without any further action have been included in emission reductions associated with the CAP and the No Project alternative. Emission reductions in the No Project alternative do not take credit for the remaining FTCMs which would require further action to result in emission reductions. Emission reductions for FTCMs adopted and implemented before and after 1990 are presented in Table 6-1.

Transportation

The No-Project Alternative would fall short of the VMT reductions projected in the CAP for Phase 1 and 2 TCMs by at least four percent. The No-Project Alternative would fall short of the VMT reductions projected in the CAP for Phase 3 by approximately 17 percent. The VMT reductions projected for the CAP are compared to those projected for the No-Project alternative in Table 6-2. Table 6-3 identifies which TCMs would be implemented under each of the alternatives.

Land Use and Planning

The No Project alternative would allow a continuation of land use development in the same growth patterns as is occurring now. In contrast to the CAP, the No Project alternative would not include the Indirect Source Control and High Density Zones at Transit Stations measure which would be the primary cause of land use impacts in the CAP.

Population, Employment and Housing

The CAP as proposed is projected to have a net positive impact on employment in the region. While the stationary source control measures would increase costs for business and possibly result in employment losses of about 11,130 jobs, this impact is offset by increases in employment in transit and government agencies due to implementation of the transportation control measures. In addition, the proposed mobility improvements would generate more than 66,250 construction jobs over a ten- to twenty-year period. The No Project alternative would thus have an adverse employment impact in comparison to the proposed plan.

Under the No Project Alternative, Indirect Source Control and intensified zoning policies proposed in the CAP would not be implemented. If the land use policies associated with these programs are not implemented, the region would have fewer options for increasing housing production and reducing the subregional imbalances between labor force and jobs that tend to increase regional transportation costs and create fiscal hardship for local government.

TABLE 6-1

EMISSION REDUCTION FROM FEDERAL TRANSPORTATION CONTROL MEASURES IN NO PROJECT ALTERNATIVE AND 1991 CAP

	FTCM Description	Daily Percentage Emission Reductions HC	CO	NO_x
Included in "No Project" Alternative and CAP				
13	All Bridge Tolls to One Dollar	-.18	-.17	-.18
15	Increase State Gas Tax by Nine Cents a Gallon	-.42	-.40	-.42
17	Continue Post-earthquake Ferry Service	-.02	-.01	-.01
	Continue BART Expanded Peak Period Service	-.20	-.17	-.19
21	Regional Transit Coordination	-.05	-.04	-.05
22	Voluntary Employer Transit Subsidies	-.06	-.05	-.06
23	Voluntary Employer Ridesharing Promotion	-.16	-.15	-.16
25	Renew Previous Signal Timing	-.20	-.30	-.25
26	Freeway Incident Management	-.42	-.65	-.35
27	MTC Guidance on Local TSM Programs	-.04	-.03	-.04
28	Local TSM Implementation	-.03	-.03	-.03
Included only in the CAP				
14	Bay Bridge Toll to Two Dollars	-.08	-.07	-.08
16	Implement New Rail Start Agreement	-.06	-.06	-.06
18	AMTRAK Service to Sacramento	-.05	-.04	-.05
19	Upgraded CALTRAIN Service	-.08	-.07	-.08
20	Regional HOV System Plan	-.23	-.20	-.22
24	Expand Arterial Signal Timing	-.21	-.30	-.25

Source: Detailed State TCM Plan Emission Reductions, Deakin, Harvey, Skabardonis, May 12 and 24, 1991.

TABLE 6-2

VMT REDUCTIONS PROJECTED FOR THE CAP AND THE NO-PROJECT ALTERNATIVE

Alternatives	Percent Daily Regional VMT Reduction		
	Phases 1 & 2	Phase 3	Total
1. CAP	10%	17%	27%
2. No-Project	6%	0%	6%

Source: Deakin, Harvey, Skabardonis Associates, June 12, 1991.

Public Health and Safety

Under the No Project alternative, TCMs proposed as part of the project would not be implemented and would not serve to generally reduce the concentrations of ozone, CO, NO_2, and benzene present in the region's air. Consequently, an existing potential public health hazard would not be reduced. Concentrations of these air pollutants would be higher, and the number of days the region exceeded State standards would be greater, under the No Project Alternative, resulting in the occurrence of known health impacts. These effects would constitute a significant adverse impact on public health.

The specific exceptions to the overall beneficial public health impact under the CAP would also not be expected to occur under the No Project alternative. First, the CAP TCMs call for increased bus, ferry and train services. Increasing these services would involve air quality impacts (e.g., potential CO hotspots, increased diesel exhaust), which could have corresponding public health impacts. Such impacts would not be expected to occur under the No Project alternative. Further, transportation services powered by electricity create demand from power generation facilities which may create air quality (and potential public heath) impacts in the areas where the power is produced. Under the No Project alternative, such effects would be lessened or avoided.

TABLE 6-3
COMPARISON OF TRANSPORTATION CONTROL MEASURES IN CLEAN AIR PLAN ALTERNATIVES
(Phase Shown in Parenthesis)

1. PROPOSED PROJECT 1991 Clean Air Plan		2. No Project Alternative	3. Acceler-ated Market-Based TCM	4. ROG First Alternative
1.	Employer Assistance Program			
a.	RIDES' outreach program (1).	Yes	Yes	Yes
b.	Telecommuting guidebook (1).	Yes	Yes	Yes
c.	Employee survey (1).	No	Yes	Yes
d.	Training materials (1).	Yes	Yes	Yes
2.	Employer Trip Reduction Rule			
a.	Trip Reduction Ordinance (1).	Yes	Yes	Yes
b.	Promote adoption of TRO (1).	Yes	Yes	Yes
c.	Adopt trip reduction rule (1).	Yes	Yes	Yes
3.	Areawide Transit Improvements			
a.	BART post-earthquake service (1).	Yes	Yes	Yes
b.	Expand Caltrain service (1).	No	Yes	Yes
c.	Comprehensive transit planning (1).	Yes	Yes	Yes
d.	Bus service expansion (1).	Yes	Yes	Yes
e.	Rail service expansion (2).	Yes	Yes	Yes
f.	Bus service expansion (2).	Yes	Yes	Yes
g.	Rail service expansion (3).	No	Yes	Yes
h.	Bus service expansion (3).	No	Yes	Yes
4.	Regional Rail Agreement Expansion			
a.	BART to Colma (1).	No	Yes	Yes
b.	Other Planned Rail Extensions (2).	No	Yes	Yes
c.	New Rail Extensions (3).	No	Yes	Yes
5.	Rail Access Improvements			
a.	Develop access plans (1).	No	Yes	Yes
b.	Implement access plans (1).	Yes	Yes	Yes
c.	Implement Access Plans (2).	No	Yes	Yes
d.	Employment Center Coordination (2).	No	Yes	Yes
e.	Implement Access Plans (3).	No	Yes	Yes
6.	Intercity Rail Service Improvements			
a.	Bay Area-Sacramento Service (1).	No	Yes	Yes
b.	Expanded Bay Area Sacramento Service (2).	No	Yes	Yes

Table 6-3 (Continued)

		2. No Project Alternative	3. Accelerated Market-Based TCM	4. ROG First Alternative
7.	Ferry Service Improvements			
a.	Post earthquake ferry service (1).	Yes	Yes	Yes
b.	Develop ferry service plan (1).	No	Yes	Yes
c.	Implement Plan (2).	No	Yes	Yes
8.	HOV Lanes on Freeways			
a.	Implement HOV lanes (1).	No	Yes	Yes
b.	Refine MTC HOV Plan (1).	No	Yes	Yes
c.	Expand HOV System (2).	No	Yes	Yes
9.	Bicycle Access Improvements			
a.	Bicycle advisory committees (1).	No	Yes	Yes
b.	Regional Bicycle Route Plan (1).	No	Yes	Yes
c.	Bikes on transit (1).	No	Yes	Yes
d.	Implement Bike Plan (1).	No	Yes	Yes
e.	Implement Bike Plan (2).	No	Yes	Yes
10.	Youth Transportation			
a.	Youth transportation study (1).	No	Yes	Yes
b.	Discount Transit Tickets (2).	No	Yes	Yes
c.	Expand School Bus Service (2).	No	Yes	Yes
d.	Student Ridesharing Service (2).	No	Yes	Yes
e.	Youth Transport Program (3).	No	Yes	Yes
11.	Freeway Traffic Operations System			
a.	Bay Bridge approaches (1).	No	Yes	Yes
b.	Refine TOS Plan (1).	No	Yes	Yes
c.	Develop AVI Plan (1).	No	Yes	Yes
d.	Highway Technology Plan (1).	No	Yes	Yes
e.	Expand TOS (2).	No	Yes	Yes
f.	Traffic Advisories (2).	No	Yes	Yes
g.	Ramp metering (2).	No	Yes	Yes
h.	Test of AVI toll collection (2).	No	Yes	Yes
i.	Implement Highway Technology (3).	No	Yes	Yes
12.	Arterial Traffic Management			
a.	Maintain Signal Timing (1).	Yes	Yes	Yes
b.	Develop Arterial Plan (1).	No	Yes	Yes
c.	Expand Signal Timing (2).	Yes	Yes	Yes
d.	Transit signal preempt (2).	No	Yes	Yes
e.	SMART streets (2).	No	Yes	Yes

Table 6-3 (Continued)

		2. No Project Alternative	3. Acceler-ated Market-Based TCM	4. ROG First Alternative
13.	Reduced Transit Fares			
a.	Inter-service discounts (1).	Yes	Yes	Yes
b.	Promote transit pass subsidies (1).	Yes	Yes	Yes
c.	More transit pass subsidies (1).	No	Yes	Yes
d.	Study fare elasticities (1).	No	Yes	Yes
e.	Bus-rail transfer subsidies (2).	No	Yes	Yes
f.	Target group subsidies (2).	No	Yes	Yes
g.	Transit stores (2).	No	Yes	Yes
14.	Vanpool Liability Insurance			
a.	Study vanpool insurance (1).	No	Yes	Yes
b.	Regionwide Vanpool Insurance Program (2).	No	Yes	Yes
15.	Rideshare Incentives			
a.	Encourage Rideshare Subsidies (1).	No	Yes	Yes
b.	Free tolls for HOV's (2).	No	Yes	Yes
16.	Indirect Source Control Program			
a.	Adopt program (1).	No	Yes	Yes
17.	Public Education			
a.	Education program (1).	Yes	Yes	Yes
b.	Education program (2).	No	Yes	Yes
c.	Eduction program (3).	No	Yes	Yes
18.	Higher Density Zoning Near Transit			
a.	Study zoning at transit stations (1).	No	Yes	Yes
b.	Encourage Higher Densities (2).	No	Yes	Yes
19.	General Plan Air Quality Elements			
a.	Local agencies adopt elements (1).	No	Yes	Yes
20.	Demonstration Projects			
a.	Telecommuting project (1).	No	Yes	Yes
b.	Alternative fuels project (1).	No	Yes	Yes
c.	Fee collection project (2).	No	Yes	Yes
21.	Revenue Measures			
a.	$1.00 bridge tolls (1).	Yes	Yes	Yes
b.	9 cents per gallon tax (1).	Yes	Yes	Yes
c.	Bridge Toll to $2.00 (2). Vehicle Registration Increased by $4.00 (2). Gas Tax Increase of $.14 /gallon (2).	No	Yes	Yes

Table 6-3 (Continued)

Market Based Measures		2. No Project Alternative	3. Accelerated Market-Based TCM	4. ROG First Alternative
a.	Smog fee (3).	No	Yes	Yes
b.	Congestion tolls (3).	No	Yes	Yes
c.	Regional parking fee (3).	No	Yes	Yes
d.	Increase Gas tax to $2.00 (3).	No	Yes	Yes

The No Project alternative would result in less demand for the use of alternative fuels, as well as ammonia (used to reduce NO_x emissions) and activated carbon (as a filtering mechanism), thereby avoiding potential adverse health and safety impacts associated with their production, distribution, use and disposal. The less-than-significant adverse public health impact corresponding to increased exposure to EMF from CAP-related power distribution facilities would be avoided. Unknown health effects of reformulated solvents would not present a potential adverse public health impact under the No Project alternative.

Some beneficial health and safety effects of the CAP such as decreased benzene and vapor emissions would not occur under the No Project alternative. Further, expected reductions in hazardous solvent wastes generated would not occur, and would not serve to lessen potential associated public health impacts.

Public Services and Utilities

There would be no other public service or utility impacts associated with mobile sources under this alternative. There would be no public service and utility impacts related to stationary source control measures under this alternative since none of the CAP measures would be implemented.

Energy

As explained above, under the No-Project alternative, some TCMs would be implemented. These measures would still reduce VMT, but not as much as the CAP would. Therefore, the beneficial energy effects of the No Project Alternative would be less than the CAP. There would be no adverse energy impacts associated with mobile sources under this alternative. There would be no energy impacts related to stationary source control measures under this alternative, since none of the CAP measures would be implemented.

Biological Resources

Since the No Project Alternative does not include the construction of new facilities, the adverse impacts of the CAP measures on biological resources would be avoided.

Geology, Soils and Seismicity

Unlike the proposed CAP, the No Project alternative would not involve grading, excavation or other earthmoving activities which could cause disruptions, displacements, compaction or overcovering of soils; changes in ground surface relief features; and erosion. Further, the No Project alternative would not be expected to result in additional development in areas of geotechnical hazards such as earthquake faults, subsidence or liquefaction areas, or landslides. Therefore, the potential adverse impact of such development exposing people and property to geologic hazards would be avoided. It should be reiterated that although construction and land use changes associated with implementation of the CAP could create adverse geologic impacts, other factors are expected to exert a greater influence in this area. Anticipated population increases in the region will result in continued development and corresponding potential for disruptions, displacement, compaction and overcovering of soils resulting in changes to topographical and ground surface relief features. Development will also occur in areas with degrees of geologic hazard.

Hydrology and Water Quality

The No Project Alternative would decrease VMT, but not as much as the CAP. Therefore, the water quality benefits of the No Project Alternative would be less than the CAP. There would be no other adverse hydrology or water quality impacts associated with mobile sources or stationary source control measures under this alternative.

Noise

Implementation of this alternative may lead to local noise impacts if there are net increases in ambient noise levels, due to changes in VMT and vehicle speeds, to levels above State or local noise standards or in areas already currently designated as noise impacted. There would be no other noise impacts associated with mobile sources or stationary source control measures under this alternative.

Cultural Resources

Unlike the proposed CAP, the No Project alternative would not have the potential to involve construction within areas of significant cultural or historical value, or in areas with previously

undiscovered archaeological sites. It would not involve development which could affect areas of neighborhood or ethnic cultural or historical value. To this extent, the No Project alternative would avoid potential adverse cultural resources impacts associated with the CAP.

Visual Quality and Aesthetics

This alternative would result in fewer beneficial visual impacts than the proposed project. Trip reduction measures would not be adopted, and air quality and visibility would not improve to the same extent as under the proposed CAP.

6.3 "ACCELERATED MARKET-BASED TCM" ALTERNATIVE

DESCRIPTION

Under the "Accelerated Market-Based TCMs" alternative, the stationary source control measures would remain exactly as proposed in the CAP. Implementation of the TCMs would be rescheduled, with the market-based TCMs proposed in Phase 3 of the CAP (after 1997), moving to Phase 1 for immediate implementation. Phase 1 for this alternative, would consist of adoption of all "reasonably available TCMs", as currently proposed in the CAP, as well as the market-based TCMs (smog fee, gas taxes, congestion pricing and parking fees) from Phase 3 of the CAP. Under this alternative, parking fees would be mandatory; parking fees at worksites, considered an option under the trip reduction rule (TCM 2) in the CAP, would be required; and, non-work parking fees, considered an option under indirect source control (TCM 16) in the CAP, would also be required. Transportation control measures identified in Phase 2 would still be scheduled for implementation after 1994, with the exception of the revenue measures identified as TCM 21 which would not be pursued, because the market-based TCMs go far beyond what is proposed in these measures.

IMPACTS

Air Quality

Emission reductions of ozone precursors and carbon monoxide would occur much sooner in the "Accelerated Market-Based TCMs" alternative, as compared to the CAP. This alternative would consequently accelerate progress toward attainment of federal and State ozone and CO standards. Implementation of this alternative would also hasten potential impacts identified in the analysis of the proposed project for market-based transportation measures (see Impact 4.1-19). Ignoring

timing, air quality benefits and impacts for stationary source control measures would be similar for this alternative as those identified in the analysis of the proposed project. On one hand, if implemented earlier, the market-based measures may not achieve the same VMT and emission reductions as under the CAP because the various transit capacity improvement measures would not yet be in place. On the other hand, the baseline emission inventory in the early 1990s is estimated to be larger than in the late 1990s due to ARB and other mobile source control measures which will take effect during the 1990s. Therefore, the gross emission reductions due to VMT decreases from market-based measures would be larger. This may compensate for less VMT reductions.

It is not possible with existing information, resources or models to estimate the effects of these factors.

Transportation

The Accelerated Market-Based TCMs alternative has identical components as does the CAP (see Table 6-3). Many of the traffic impacts discussed for the CAP would also result from the implementation of this alternative although the timing of the impacts would be different. The Market-Based alternative would result in Market-Based TCMs originally scheduled in Phase 3 (after 1997) of the CAP, being implemented in Phase 1 (before 1994). The earlier implementation of these measures would not allow sufficient time for full implementation of the various transit capacity improvement measures including HOV lane measures and transit access improvement measures that would provide the necessary capacity to carry the traffic demands diverted by the market-based measures. In addition, this alternative could result in deterioration in transit service if the market based measures resulted in a large increase in transit ridership, and transit vehicle fleets were not able to accommodate the increased demand. The potential CAP impacts of increased parking overflows and increased traffic on local streets near transit stations would be exacerbated under this alternative.

Land Use and Planning

Implementation of the "Accelerated Market-Based TCM" Alternative would cause the same impacts as the CAP, however, due to the difference in phasing, impacts in the short-term would differ. With the implementation of market-based measures first, without accompanying mobility improvements until Phase 2, short-term impacts to land use and development would be more severe

than the CAP. As economic pressures increase (due to market based measures), there would be corresponding pressure to develop land uses which contain a balance of jobs and housing. There would also be additional pressure to develop alternate methods of transportation particularly for commuters who would be subject to increased costs of driving to work.

Until alternate forms of transportation were developed, the additional costs of market-based measures would increase the cost of living and doing business in the Bay Area, possibly causing a shift of employers, jobs, and residents to areas outside the region.

Population, Employment and Housing

According to ABAG projections, the region is facing an acute shortage of labor due to insufficient housing production. Business has experienced difficulty in recruiting workers from outside the region due to the high costs of housing and other living expenses. The market-based measures would result in billions of dollars of added costs to business and the general public. If these costs are imposed before adequate transportation alternatives are available, this would further retard the ability of business to expand in the region. This would have an adverse impact on employment growth in the short term until the mobility improvements are completed. If some businesses close their operations in the region rather than wait for implementation of the major transit and freeway improvements proposed in the CAP, this would cause the spread of economic blight in the affected communities that could lead to significant physical decay, loss of government revenues and significant environmental damage as local agencies and businesses are unable to maintain the infrastructure that is needed to protect environmental quality.

Public Health and Safety

Because this alternative would not affect stationary source control measures, health and safety impacts related to those measures would not be affected. Adverse health and safety impacts of the CAP are generally associated with stationary source control measures and non-market-based TCMs. Therefore, this alternative would not compound or otherwise affect these impacts. In relation to beneficial health impacts associated with TCMs, the timing of the impacts would be affected under this alternative, but not the nature of the impacts. For example, TCMs such as a gas tax increase which are expected to result in reduced concentrations of CO, NO_2, ozone and benzene would be

implemented earlier, with corresponding beneficial health impacts also occurring on an accelerated schedule.

Public Services and Utilities

Public service and utility impacts from all TCMs would be the same as for the CAP, with the exception that impacts from market-based measures would occur during Phase 1, and not Phase 3. All public service and utility impacts for stationary source control measures would remain the same as those described for the CAP.

Energy

In the short-term energy impacts from this alternative would be less than those for the CAP. Since a lack of mobility improvements in the early 1990s would result in less trip reductions than the CAP, energy savings in the short-term would be less also. All energy impacts for stationary source control measures would remain the same as those described for the CAP.

Biological Resources

Biological resource impacts would be the same as described for the CAP, except that economically-induced land use changes and associated impacts would occur earlier.

Geology, Soils and Seismicity

Geology and seismicity impacts of the Accelerated Market-Based TCM alternative are not expected to differ from those of the proposed project, either in their nature or timing.

Hydrology and Water Quality

Hydrology and water quality impacts from the Accelerated Market-Based TCM Alternative would be the same as for the CAP, with the exception that impacts from market-based measures would occur during Phase 1 rather than Phase 3. All water quality impacts for stationary source control measures would remain the same as those described for the CAP.

Noise

Noise impacts from the Accelerated Market-Based TCMs Alternative would be the same as for the CAP, with the exception that noise impacts from market-based measures would occur during Phase 1 rather than Phase 3. In addition, since the market-based measures would be imposed before all the necessary mobility improvements would be in place, all noise impacts due to decreased VMT and increased vehicle speeds would occur later than they would under the CAP.

Under this alternative, all the stationary source control measures would remain exactly as proposed in the CAP. Similarly, all noise impacts for stationary source control measures would remain the same as those described for the CAP.

Cultural Resources

Cultural resources impacts of the Accelerated Market-Based TCM alternative are not expected to differ from those of the proposed project, either in their nature or timing.

Visual Quality and Aesthetics

Beneficial and adverse visual impacts attributable to stationary source control measures would be the same as those previously discussed in the Draft EIR for the CAP. However, because the market-based measures would be implemented before the mobility improvements, the beneficial visual impacts associated with the mobility improvements would not be realized as quickly. Ultimately the long-term visual impacts would be the same, while short-term impacts would be less than with the proposed project.

6.4 "ROG-FIRST CONTROL STRATEGY" ALTERNATIVE

DESCRIPTION

Under the "ROG-First Control Strategy" alternative, the TCMs would remain exactly as proposed in the CAP. Adoption of stationary source control measures reducing ROG emissions would be rescheduled under this alternative. Those control measures achieving the largest ROG emission reductions would be adopted first. Many ROG control measures or subcomponents of ROG measures currently scheduled for later planning cycles would be moved up to the 1991-1994 planning cycle. Those ROG control measures for which technological limitations preclude earlier

adoption would remain on the adoption schedule proposed in the CAP. All NO_x control measures, identified under Category D, Combustion of Fuels (NO_x Sources) in the CAP, would be moved to later planning cycles. Table 6-4 lists those control measures that would be adopted before 1994 under this alternative and their respective emissions reductions estimates. Note that the emission reductions in Table 6-4 were accounted for in the CAP in later phases. Under this alternative, these reductions would occur before 1994, as opposed to occurring in later planning cycles under the proposed CAP.

IMPACTS

Air Quality

The ROG-First alternative would accelerate emission reductions from stationary sources of ROG and delay emission reductions of NO_x from stationary sources. Air quality modeling sensitivity tests indicate that reducing ROG only would be approximately as effective in reducing overall ambient ozone concentrations as reducing ROGs and NO_x simultaneously, as proposed in the CAP. In addition, the ROG-First strategy would reduce the potential for ozone "hotspots". Preliminary estimates of population exposure to ozone levels above the State standard indicate that ROG emission reductions alone reduce population exposure more dramatically than a combined ROG and NO_x emission reduction approach. This alternative would also hasten potential impacts identified in the analysis of the proposed CAP for those stationary control measures for which implementation would be accelerated (see Impacts 4.1-21, 22, and 23). Air quality benefits and impacts for mobile source control measures would be similar for this alternative as those identified in the analysis of the proposed project.

Transportation

The ROG-First alternative assumes identical TCMs as the CAP (see Table 6-3). The same traffic impacts discussed for the CAP would also result from the implementation of this alternative.

Land Use and Planning

The "ROG First Control Strategy" Alternative would have the same land use impacts as the 1991 CAP Plan.

TABLE 6-4

STATIONARY SOURCE CONTROL MEASURES TO BE IMPLEMENTED BEFORE 1994 UNDER THE "ROG-FIRST" ALTERNATIVE (Tons/Day)

Control Measure (Group/Measure)		Estimated Emission Reduction
A	**Surface Coating and Solvent Use**	
A8	Magnet Wire Coating Operations	0.12 - 0.15
A9	Auto Assembly Coating Operations	0.94 - 1.32[1]
A14	Coatings & Ink Manufacturing	0.45 - 0.60[1]
A16	Semiconductor Manufacturing	0.11 - 0.12
A17	Control of Emissions from Household Solvent Disposal	0.36
B	**Fuels/Organic Liquids Storage and Distribution**	
B1	Control of Emissions from Railcar Loading	0.08
B2	Storage of Organic Liquids	1.17 - 1.44[1]
B4	Gasoline Delivery Vehicles	0.13 - 0.17
B6	Organic Liquids Clean-Up	0.07
B7	Propane Handling	0.09 - 0.10
C	**Refinery and Chemical Plant Processes**	
C2	Pump & Compressor Seals at Refineries and Chemical Plants	0.94 - 1.04[1]
C3	Valves & Flanges at Refineries and Chemical Plants	2.26 - 3.07[1]
C5	Wastewater (Oil-Water) Separators	2.49 - 2.62
E	**Other Industrial/Commercial Processes**	
E1	Rubber Products Manufacturing	NA
E3	Commercial Charbroiling	1.50
Total additional ROG reductions by 1994		**10.71 - 12.64**

[1]Ninety percent of the emission reductions for these control measures, as identified in Table 8 of the CAP, would occur before 1994 under the "ROG-First" alternative; the remaining ten percent would occur as scheduled in the CAP.

NA = Not Available.

Source: BAAQMD

Population, Employment and Housing

The ROG measures have a much smaller employment impact than do the NO_x measures. Therefore, while this alternative would increase the ROG-measure impacts in Phase 1, its main impact would be to shift the employment losses due to the NO_x measures out of Phase 1 and into Phase 2. Thus, the overall employment impact in Phase 1 would be reduced from that generated by the CAP.

Public Health and Safety

Similar to the Market-Based TCMs alternative, the ROG-First Control Strategy alternative would affect the timing of impacts rather than the nature of the impacts themselves. Impacts of TCMs would not change. Rather, some stationary source control measures would be rescheduled, resulting in an accelerated schedule for the associated beneficial and adverse impacts. For example, control measures A8 and A9 would be implemented at an earlier date, thereby contributing to a possible earlier reduction in population exposure to ambient ozone concentrations above the State standard. However, these control measures are also associated with potential adverse health impacts from possible increased emissions of substances which may be toxic as a result of reformulations with non-precursor or "exempt" solvents.

Public Services and Utilities

Under this alternative, all the transportation control measures would remain exactly as proposed in the CAP. Similarly, all public service and utility impacts for transportation control measures would remain the same as those described for the CAP.

Public service and utility impacts associated with the rescheduled measures would remain the same as described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Public service and utility impacts for all other stationary source control measures would be the same as those described in the CAP.

Energy

Energy impacts for transportation control measures would remain the same as those described for the CAP. Energy impacts associated with the rescheduled measures would remain the same as

described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Energy impacts for all other stationary source control measures would be the same as those described in the CAP.

Biological Resources

The impacts of this alternative on biological resources would be no different than for the CAP.

Geology, Soils and Seismicity

In general, the control measures subject to earlier implementation under this alternative do not involve new construction or other activities which are expected to have geology or seismicity impacts. Therefore, the impacts of the ROG-First Control Strategy alternative are expected to be the same as those identified for the proposed CAP.

Hydrology and Water Quality

Hydrology and water quality impacts for transportation control measures would remain the same as those described for the CAP. Water quality impacts associated with the rescheduled measures would remain the same as described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Water quality impacts for all other stationary control measures would be the same as those described in the CAP.

Noise

Noise impacts for transportation control measures would remain the same as those described for the CAP. Noise impacts associated with the rescheduled measures would remain the same as described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Noise impacts for all other stationary source control measures would be the same as those described previously in this EIR.

Cultural Resources

In general, the control measures subject to earlier implementation under this alternative do not involve new construction or other activities which are expected to have cultural resources impacts.

Therefore, the impacts of the ROG-First Control Strategy alternative are expected to be the same as those identified for the proposed project.

Visual Quality and Aesthetics

This alternative would not offer all the beneficial impacts of the proposed CAP because the NO_x control measures would not be implemented until later. NO_x results in the whiskey-brown colored haze that is highly visible and impairs long-distance views. NO_x emissions would not decrease as soon as with the proposed CAP.

6.5 ALTERNATIVES EVALUATION

Based on the alternatives analyzed, the environmentally superior alternative is the "Accelerated Market-Based TCMs." This alternative achieves the project objective – clean air – at the quickest rate. Correspondingly, the population's exposure to high levels of ozone and carbon monoxide would also decrease sooner. Although, as with all of the alternatives analyzed, there are adverse environmental impacts associated with this alternative, the benefits of improving air quality through this alternative outweigh the adverse impacts. Because the objective of the CAP is the attainment of the State ambient air quality goal by the earliest practicable date, the environmentally superior alternative is the one that achieves this goal with the least adverse environmental impacts to other resources. This is accomplished by the "Accelerated Market-Based TCMs." The resources most affected by the various alternatives include air quality, transportation, land use and planning, and, population, employment and housing. The impacts associated with these resources are explored for each of the alternatives below.

The "Accelerated Market-Based TCMs" would achieve the greatest emission reductions followed by the CAP, the "ROG-First Control Strategy" and finally the "No Project" alternative. Increased emission reductions through the "Accelerated Market-Based TCMs" are achieved solely through earlier implementation of market-based TCMs. Both the CAP and the "ROG-First Control Strategy" contain market-based transportation control measures but do not implement these controls until after 1997. The "No Project" alternative would not contain the market-based TCMs proposed in the CAP and therefore would not achieve emission reductions through these controls. With respect to the stationary source emissions, the same emission reductions would be achieved at the same rate by the "Accelerated Market-Based TCMs" alternative, the CAP and the "ROG-First

described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Energy impacts for all other stationary source control measures would be the same as those described in the CAP.

Biological Resources

The impacts of this alternative on biological resources would be no different than for the CAP.

Geology, Soils and Seismicity

In general, the control measures subject to earlier implementation under this alternative do not involve new construction or other activities which are expected to have geology or seismicity impacts. Therefore, the impacts of the ROG-First Control Strategy alternative are expected to be the same as those identified for the proposed CAP.

Hydrology and Water Quality

Hydrology and water quality impacts for transportation control measures would remain the same as those described for the CAP. Water quality impacts associated with the rescheduled measures would remain the same as described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Water quality impacts for all other stationary control measures would be the same as those described in the CAP.

Noise

Noise impacts for transportation control measures would remain the same as those described for the CAP. Noise impacts associated with the rescheduled measures would remain the same as described for the CAP, with the exception that the impacts would occur sooner for affected ROG measures and later for delayed NO_x measures. Noise impacts for all other stationary source control measures would be the same as those described previously in this EIR.

Cultural Resources

In general, the control measures subject to earlier implementation under this alternative do not involve new construction or other activities which are expected to have cultural resources impacts.

Therefore, the impacts of the ROG-First Control Strategy alternative are expected to be the same as those identified for the proposed project.

Visual Quality and Aesthetics

This alternative would not offer all the beneficial impacts of the proposed CAP because the NO_x control measures would not be implemented until later. NO_x results in the whiskey-brown colored haze that is highly visible and impairs long-distance views. NO_x emissions would not decrease as soon as with the proposed CAP.

6.5 ALTERNATIVES EVALUATION

Based on the alternatives analyzed, the environmentally superior alternative is the "Accelerated Market-Based TCMs." This alternative achieves the project objective – clean air – at the quickest rate. Correspondingly, the population's exposure to high levels of ozone and carbon monoxide would also decrease sooner. Although, as with all of the alternatives analyzed, there are adverse environmental impacts associated with this alternative, the benefits of improving air quality through this alternative outweigh the adverse impacts. Because the objective of the CAP is the attainment of the State ambient air quality goal by the earliest practicable date, the environmentally superior alternative is the one that achieves this goal with the least adverse environmental impacts to other resources. This is accomplished by the "Accelerated Market-Based TCMs." The resources most affected by the various alternatives include air quality, transportation, land use and planning, and, population, employment and housing. The impacts associated with these resources are explored for each of the alternatives below.

The "Accelerated Market-Based TCMs" would achieve the greatest emission reductions followed by the CAP, the "ROG-First Control Strategy" and finally the "No Project" alternative. Increased emission reductions through the "Accelerated Market-Based TCMs" are achieved solely through earlier implementation of market-based TCMs. Both the CAP and the "ROG-First Control Strategy" contain market-based transportation control measures but do not implement these controls until after 1997. The "No Project" alternative would not contain the market-based TCMs proposed in the CAP and therefore would not achieve emission reductions through these controls. With respect to the stationary source emissions, the same emission reductions would be achieved at the same rate by the "Accelerated Market-Based TCMs" alternative, the CAP and the "ROG-First

Control Strategy." The "No Project" alternative would result in less emission reductions than the other two alternatives and the proposed project.

A comparison of the transportation impacts from the various alternatives shows similar impacts for the CAP and the "ROG-First Control Strategy," with different and more adverse impacts occurring under the "Accelerated Market-Based TCMs" and the "No Project" alternative. Impacts from the implementation of the "Accelerated Market-Based TCMs" would occur if transit capacity improvement measures were not in place to satisfy the increased demands caused by the market-based measures. These impacts could be mitigated somewhat by implementing the market-based measures gradually. Impacts from the "No Project" alternative would result from lower VMT reductions achieved under this alternative compared with the CAP and the "ROG-First Control Strategy."

Land use and planning impacts, as defined under CEQA, would be less severe under the "No Project" alternative compared with the other alternatives and the proposed project. Land use impacts arise from disturbing the status quo; therefore, the "No Project" alternative would not create any land use impacts. Land use impacts under the "Accelerated Market-Based TCMs" would be similar to those described for the CAP; however, these impacts would occur sooner under this alternative. The "ROG-First Control Strategy" would bring about the same land use and planning impacts as those described under the CAP.

The CAP would increase jobs and housing production, and dramatically increase population. The "No Project" alternative would not stimulate employment, housing or population in the Bay Area, and therefore growth would occur following today's trends. The impacts of the "Accelerated Market-Based" Alternative would be similar to the CAP in these areas.

As noted above, the BAAQMD has concluded that it would not be possible to obtain legislative authority for the market-based measures immediately. Therefore, although the "Accelerated Market-Based TCMs" alternative is environmentally superior, it is not believed to be politically achievable in the near term. Thus, this alternative would not be an acceptable control strategy under the CCAA, given the requirement that severe areas adopt all feasible measures.

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9. GLOSSARY AND ABBREVIATIONS

9. GLOSSARY OF TECHNICAL TERMS AND ACRONYMS

ABAG	Association of Bay Area Governments
ACGIH	The American Conference of Governmental Industrial Hygienists
ammonia injection	a noncatalytic process that controls NO_x in combustion flue gas by reducing NO to N_2 and H_2O in the presence of oxygen with injection of ammonia as the reducing agent.
ammonia slip	Selective Catalytic Reduction (SCR) systems inject ammonia into the flue gas of boilers and engines to react with the NO_x and reduce emissions. Ammonia that does not react with the NO_x passes or "slips" through the reactor vessel and is released into the atmosphere from the stack.
AQP	The 1982 Air Quality Plan
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BCDC	Bay Conservation and Development Commission
BTU	British thermal unit
CAA	federal Clean Air Act
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CARB	California Air Resources Board
CBC	California Building Code
CCAA	California Clean Air Act
CDFG	California Department of Fish and Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNEL	community noise equivalent level

CNG	compressed natural gas
CO	carbon monoxide
COE	U. S. Army Corps of Engineers
COHb	carboxyhemoglobin
dB	decibel
dBA	A-weighted decibel scale
DHS	California Department of Health Services
District	Bay Area Air Quality Management District
DMV	Department of Motor Vehicles
EIP	EIP Associates
EIR	environmental impact report
EPA	U. S. Environmental Protection Agency
FEMA	U. S. Federal Emergency Management Agency
FGR	flue gas recirculation
FTCM	federal transportation control measures
FWS	U. S. Fish and Wildlife Service
H_2O	water
HWMP	Hazardous Waste Management Plan
ISWMP	Integrated Solid Waste Management Plan
kV	kilovolts
kWh	kilowatt-hour
Ldn	day/night noise level
Leq	equivalent noise level

LOS	level of service
LPG	liquid petroleum gas
MBtu	one million Btu's in electrical usage
Mcf	million cubic feet.
MG	million gallons
MMBtu	one million Btu's for petroleum and gas applications
mph	miles per hour
MW	megawatts
MTC	Metropolitan Transportation Commission
NCR	nonselective catalytic reduction: a NO_x flue gas control technology that uses a reducing agent other than ammonia, such as H_2, CO, or hydrocarbons, that acts nonselectively, reacting with SO_x, O_2, and NO_x.
NGVs	natural gas vehicles
NH_3	ammonia
NO	nitric oxide
NO_2	nitrogen dioxide
NOP	notice of preparation
NO_x	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System
NSCR	nonselective catalytic reduction; a type of post-combustion flue gas control involving ammonia injection
ozone	O_3; the major constituent of smog formed through a complex series of chemical reactions and transformations in the presence of sunlight
PM_{10}	particulate matter of 10 microns or less
ppm	parts per million

ROGs	reactive organic gases
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SCM	stationary control measure
SCR	selective catalytic reduction: a type of post-combustion flue gas control involving ammonia injection that chemically reduces NO_x over a heterogeneous catalyst in the presence of oxygen
SIP	State Implementation Plan
SO_x	oxides of sulfur
SO_2	sulfur dioxide
TACs	toxic air contaminants
TCM	transportation control measure
TIP	Transportation Improvement Program
TLV	threshold limit value
TSP	total suspended particulates
transfer efficiency	the ratio of weight or volume of coating solids adhering to the substrate to the total weight or volume of coating solids used in the process
VMT	vehicle miles travelled
VOC	volatile organic compounds
WQCP	Water Quality Control Plan